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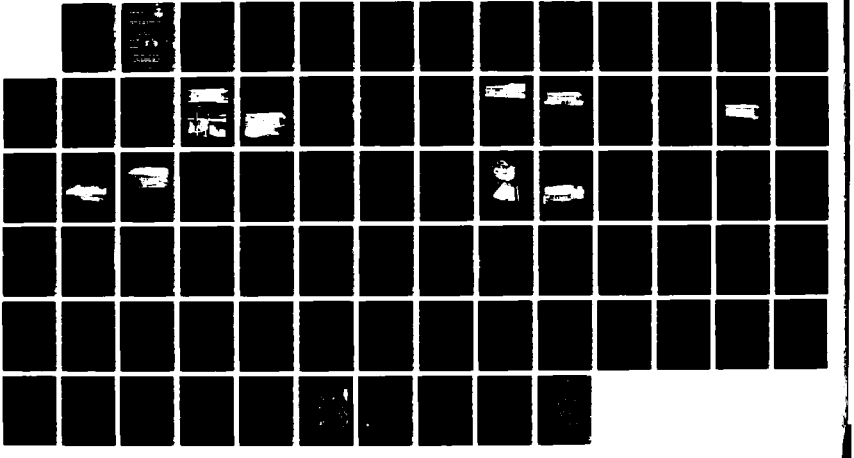

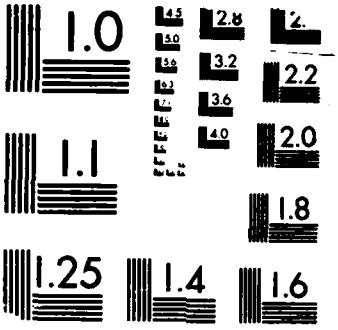

USAFOEHL REPORT

88-004EQ0062AWA

WASTEWATER AND HAZARDOUS WASTE SURVEY, ENGLAND AFB LA

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January 1988

Final Report

USAF Occupational and Environmental Health Laboratory
Human Systems Division (AFSC)
Brooks Air Force Base, Texas 78235-5501

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

A wastewater characterization and hazardous waste survey was conducted at England AFB by USAFOEHL personnel to address a compliance order given to the base by the State of Louisiana Office of Solid and Hazardous Waste. The compliance order identified several deficiencies in the England AFB hazardous waste program and tasked the base to provide the City of Alexandria with analytical data regarding any and all discharges into the sanitary sewer system. The results of the hazardous waste survey showed the base hazardous waste program was running smoothly. The accumulation site managers have a good understanding of the overall waste management program. The base has effectively minimized solvent waste handling through the widespread use of Safety Kleen cleaning vats. The analytical results from the wastewater survey showed arsenic, cadmium, benzene, chlorinated benzene, and fuel components above the applicable discharge ordinance, City of Alexandria Local Ordinance 27.5-8. However, the concentrations of the chemicals were near the discharge limits. The results of the characteristics hazardous waste analysis showed the separator located (over)

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outside the Armament Shop (building 2102) contained hazardous waste. Fire training pit operations could exceed the fire training pit oil/water separator capacity.

Recommendations: (1) Wastestreams found to exceed the discharge ordinance should be resampled to confirm the chemical concentrations. (2) The separator located outside the Armament Shop (building 2102) should be cleaned out and the contents disposed of as hazardous waste. (3) The inlet pipe to the fire training pit separator should be throttled to limit the pit drainage rate to 35 GPM. (4) Sludge from waterfall paint booths on England AFB should be tested for hazardous waste and disposed of accordingly. (5) Disposal practices for rags should be standardized basewide. (6) A training program, integrating the technical expertise of the BEE and DEEV, should be initiated to train shop personnel on the operating principles and limitations of oil/water separators. (7) Wastewater from clean-out operations of bulk fuel storage tanks should be analyzed and compared to 40 CFR 433.15. (8) POL Farm personnel should stop their current practice of draining water from the stationary fuel storage tanks, without a catch basin. (9) Bowsers at Building 529 accumulation site should be repositioned away from the storm drain. (10) The oil/water separator at the AGE shop should be repaired as soon as possible. (11) The oil/water separator located behind the old test cell building should be pumped out and closed. (12) The possibility of substituting Safety Kleen for the 1,1,1-trichloroethane at the Fire Department should be investigated. (13) Waste floor polish remover should be discharged to the sanitary sewer, not the storm drainage system. (14) Bioenvironmental Engineering Section personnel should establish a routine sampling protocol for hazardous waste and industrial wastestreams. (15) England AFB should petition the State of Louisiana for a separate EPA identification number for the base's Lake Charles Radar Site. (16) Hazardous wastes listed in the USAFOEHL report should also be listed on the notification form given to State of Louisiana Regulatory Officials in March 1987. If any discrepancies exist, an amendment should be filed. (17) The base should consider a more frequent clean-out schedule for some separators based on usage and a routine inspection program. (18) A satellite hazardous waste storage site should be constructed adjacent to the CES Protective Coating Shop for storage of waste paint prior to transport to DRMO at Ft Polk.

ACKNOWLEDGEMENTS

The authors greatly appreciate the technical expertise and hard work provided by the other members of our survey team, Maj Elliot Ng, 1Lt Robert Tetla, TSgt Benjamin Hernandez, and SSgt Mary Fields, without whose valuable assistance this survey could never have been accomplished.

We also acknowledge the help provided by Mr Cecil Lewis, 2Lt Tom Rolka, and the staff of the Bioenvironmental Engineering Section during the survey. Finally, we would like to thank all of the various shop personnel at England AFB for their excellent cooperation and extra effort in assuring the success of the survey. Your performance and conduct throughout was exemplary.

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I. INTRODUCTION

On 16 Apr 87 England AFB received a compliance order from the State of Louisiana Office of Solid and Hazardous Waste. The compliance order identified several deficiencies in the England AFB hazardous waste program, and tasked the base to provide the City of Alexandria with analytical data regarding any and all discharges into the sanitary sewer system. As a result, in a 1 Jun 87 letter, HQ TAC/SGPB requested USAF Occupational and Environmental Health Laboratory (USAFOEHL) to perform a wastewater characterization and hazardous waste survey at England AFB, Louisiana. The results of the survey are needed to satisfy the hazardous waste compliance order given to the base by the state.

The objectives of the survey were to characterize wastewater leaving the base and to determine if any industrial discharge from the base could be considered hazardous waste. Wastewater characterization parameters are presented in Table 1, while hazardous waste characteristics are listed in Table 3.

Wastewater and hazardous waste sampling sites in the sewer system were identified after a review of the base Bioenvironmental Engineer (BEE) shop folders or from the base's hazardous waste abatement plan (11). A total of 10 sites were tested for wastewater quality and 20 sites were analyzed for characteristic hazardous waste. Observations and conclusions were based on a comparison between the survey results, and either the local wastewater discharge ordinance, the Federal Resource Conservation and Recovery Act, or the Louisiana State Hazardous Waste Regulations.

The wastewater survey was conducted by 1Lt Robert A. Tetla, 2Lt Charles W. Attebery, TSgt Ben Hernandez, and SSgt Mary Fields. The hazardous waste survey was conducted by Major Elliot K. Ng and 1Lt Francis E. Slavich. The survey was performed from 22 Jun to 2 Jul 87.

II. BACKGROUND

England AFB (EAFB), home of the Flying Tigers, is located approximately 5 miles west of Alexandria, Rapides Parish, Louisiana.

The area is a humid, semitropical climatic zone where the average annual precipitation is 64.51 inches. One-third of this precipitation falls in April and May and the maximum 24-hour rainfall has been recorded as 10.18 inches. Relative humidity is generally high. During a one-year period the wet bulb temperature was above 73°F for 2274 hours. Snowfall is practically nonexistent. Winds are gentle, velocities being above 24 MPH for only 0.4% of the total time. During this survey the average high and low temperatures were 90° and 70°F, respectively; and the precipitation totaled 4.45 inches.

The base population at the time of the survey included 3,145 military personnel, 1,720 dependents, and 1,003 civilian employees.

A. Wastewater system: Industrial operations stem from facility, aircraft, and vehicle maintenance. Industrial wastewater typically flows through an oil/water separator, into the sanitary sewer, to the base main lift station, and off base to the City of Alexandria's municipal sewage treatment plant.

B. England AFB Sewer Wastewater Discharge Limitations: Industrial discharge limitations for England AFB are contained in the City of Alexandria's Local Ordinance 27.5-8. The restrictions pertaining to the survey performed by USAFOEHL are contained in Article II. These restrictions are listed below:

1. No person shall discharge or cause to be discharged any of the following described waters or wastes to any public sewers:

a. Any gasoline, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid or gas.

b. Any waters or wastes containing toxic or poisonous solids, liquids, or gases in sufficient quantity, either singly or by interaction with other wastes, to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, create a public nuisance, or create any hazard in the receiving waters of the sewage treatment plant, including but not limited to, cyanides (CN) in excess of one mg/L as CN in wastes discharged to the public sewers.

c. Any water having a pH lower than 5.5 or higher than 9.5.

d. Any water containing fats, wax, grease, or oils, whether emulsified or not, in excess of 100 mg/L.

e. Any waters or wastes containing in excess of these amounts (expressed in mg/L) of the following materials:

Arsenic	0.05
Barium	5.0
Boron	1.0
Chromium	2.0
Copper	1.0
Lead	0.1
Manganese	1.0
Nickel	1.0
Tin	1.0
Zinc	5.0

2. Maximum limits for discharge of heavy metals shall include, but not be limited to:

Cadmium	0.02 mg/L
Mercury	0.005 mg/L
Selenium	0.02 mg/L
Silver	0.10 mg/L

3. Prohibited heavy metal and toxic material shall include, but not be limited to the following materials:

Antimony	Rhenium
Beryllium	Strontium
Bismuth	Tellurium
Cobalt	Herbicides
Molybdenum	Fungicides
Pesticides	Uranyl ion

4. Any waters or wastes containing phenols or other taste-or-odor producing substances, in such concentration exceeding limits, after treatment of the composite sewage, to meet the requirements of the State, Federal, or other public agencies of jurisdiction for such discharge to the receiving waters.

C. Characteristic Hazardous Waste Discharge Regulations: Characteristic hazardous waste parameters were monitored and compared to criteria listed in the Code of Federal Regulations Title 40 (40 CFR) section 261. The comparison criteria are presented below:

1. Ignitability: A substance is considered ignitable hazardous waste if it has a flash point below 140°F.

2. Corrosivity: A substance is considered corrosive hazardous waste if it has a pH greater or equal to 12.5 or less than or equal to 2.0.

3. Reactivity: A substance is considered a reactive hazardous waste if it contains 250 mg/L cyanide and/or 500 mg/L sulfide. These concentrations are listed in an interim guidance amendment to the RCRA.(13).

4. EP Toxicity: The maximum concentrations of contaminants for the characteristic of EP Toxicity are listed below, in mg/L:

Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0
Endrin	0.02
Lindane	0.4
Methoxychlor	10.0
Toxaphene	0.5
2,4-D	10.0
2,4,5-TP Silvex	1.0

III. PROCEDURES

A. Wastewater Survey

1. *Sampling Parameters and Site Locations:*

a. Sewer Sites - The following tables list the sampling parameters (Table 1) and corresponding sewer sampling sites (Table 2).

Table 1: Wastewater Characterization Parameters

EPA Method SW-846 8010 includes the following volatile halogenated organic compounds:

1. Bromodichloromethane
2. Bromoform
3. Bromomethane
4. Carbon tetrachloride
5. Chlorobenzene
6. 2-Chloroethylvinyl ether
7. Chloroform
8. Chloromethane
9. Dibromochloromethane
10. 1,2-Dichlorobenzene
11. 1,3-Dichlorobenzene
12. 1,4-Dichlorobenzene
13. Dichlorofluoromethane
14. 1,1-Dichloroethane
15. Benzyl chloride
16. Bis (2-chloroethoxy) methane
17. Bis (2-Chloroisopropyl) ether
18. Bromobenzene
19. Chloracetaldehyde
20. Chloral
21. Dichlorodifluoromethane
22. 1,1,2,2-Tetrachloroethane
23. Trichloropropane
24. Chloromethyl methyl-ether
25. Dichloromethane

EPA Method SW846 8020 includes the following aromatic volatile organic compounds:

1. 1,2-Dichloroethane
2. Trans 1,2-Dichloroethane
3. 1,2-Dichloropropene
4. Cis 1,3-Dichloropropene
5. Trans 1,3-Dichloropropene
6. Methylene chloride
7. 1,1,2,2-Tetrachloroethane
8. Tetrachloroethylene
9. 1,1,1-Trichloroethane
10. 1,1,2-Trichloroethane
11. Trichloroethylene
12. Trichlorofluoromethane
13. Vinyl chloride
14. Benzene
15. Chlorobenzene
16. 1,2-Dichlorobenzene
17. 1,3-Dichlorobenzene
18. 1,4-Dichlorobenzene
19. Ethylbenzene
20. Toluene
21. P-Xylene
22. M-Xylene
23. O-Xylene

EPA Method 200.7, Inductively Coupled Plasma Metals (ICP) includes the following:

1. Arsenic
2. Cadmium
3. Chromium
4. Copper
5. Lead
6. Mercury
7. Nickel
8. Selenium
9. Silver
10. Zinc
11. Antimony
12. Beryllium
13. Thallium
14. Zinc

EPA Method 418.1 Oil and Grease
EPA Method 425.1 Surfactants Methylene Blue Active Substances, (MBAS)

Table 2: Sample Site Identification

Site	Location
1	CE main lift station
2	CE complex by Bldg 1703
3	Photo Lab, Bldg 1009
4	NDI, Bldg 2528, corrosion control washrack
5	Pond by country club
6a	Main lift station, Bldg 818, composite 1
6b	Main lift station, Bldg 818, composite 2
6c	Main lift station, Bldg 818, composite 3
7	Corrosion Control, Bldg 2502
8	Jet Engine Repair, Bldg 2102
9	Vehicle Maintenance, Bldg 1707
10	Jet Engine Test Cell, Bldg 2618

b. Hazardous Waste Parameters and Sampling Sites - The parameters to determine whether wastes are hazardous are listed in Table 3. Parameters to determine sites with hazardous sampling characteristics are listed in Table 4.

Table 3: Hazardous Waste Parameters

Parameter Tests:

Corrosivity: (tests for pH > or = 12.5 and < or = 2.0)
Ignitability: (tests for flammability less than 140°F)
Reactivity: (tests for CN and S)
EP Toxicity: (tests for metals, As, Ba, Cd, Cr, Pb, Hg, Ag, and Se)

Table 4: Hazardous Waste Sites

Site	Location
11	CE washrack separator, Bldg 1714
12	Vehicle Maintenance separator, Bldg 1707
13	Fire training pit separator, Bldg 2409
14	Auto hobby shop separator, Bldg 1434
15	Vehicle Maintenance washrack separator, Bldg 1707
16	EGRESS, north separator, Bldg 525
17	EGRESS, south separator, Bldg 525
18	AGE separator, Bldg 120
19	Refueling separator, Bldg 2401
20	Refueling separator, Bldg 2403
21	Jet Engine test pad separator, Bldg 2612
22	Corrosion control washrack sep., Bldg 2525
23	Fire station separator, Bldg 500
24	Jet Engine test cell separator, Bldg 2618
25	Armament separator, Bldg 2108 (closed)
26	EGRESS, storm drain, Bldg 525
27	Auto Hobby paint booth, Bldg 1434
28	Corrosion control left paint booth, Bldg 2502
29	Corrosion control right paint booth, Bldg 2502
30	Pond sludge

2. *Sampling Procedures:*

Equiproportional composite samples were taken hourly for 24 hours at Sites 1-9. These samples were analyzed for the wastewater characterization parameters listed in Table 1. The sampling was accomplished using ISCO Model 2700 Automatic Composite Samplers. Grab samples were taken at sites 10-30. Sites 1-10 were analyzed for purgeable halocarbons (SW-846 8010) and purgeable aromatics (SW-846 8020), while sites 10-30 were analyzed for characteristic hazardous waste. Samples were taken from oil/water separators by filling the sample containers with a mixed sample from portions of the aqueous and oil phases if oil was present. Analysis and preservation methods are summarized in Table 5.

Table 5: Analysis and Preservation Methods

Analysis	Preservation	Method	Where	Who
pH	none	A423	on-site	USAFOEHL
Temperature	none	E170.1	on-site	USAFOEHL
Purgeable Halocarbons	HCl	S8010	contract-lab	UBTL
Purgeable Aromatics	HN_3	S8020	contract-lab	UBTL

Table 5 Continued

Analysis	Preservation	Method	Where	Who
ICP Metals Screen As, B, Cd, Ca, Cr, Co, Fe, Pb, Mg, Mn, Ni, La, Mg, Se, Zn, Ag, Al, Ba, Be	HNO_3	E200.7	Brooks AFB	USAFOEHL
Mercury	HNO_3	E245.1	Brooks AFB	USAFOEHL
Oils and Grease, Total Recoverable	H_2SO_4	E418.1	Brooks AFB	USAFOEHL
Characteristic Hazardous Waste (Ignitability, Corrosivity, EP Toxicity, Reactivity)	none	E625	Brooks AFB	USAFOEHL

Notes: A indicates Standard Methods for the Evaluation of Water and Wastewater.(1)
E indicates EPA Methods for Chemical Analysis of Water and Wastes.(8)
S indicates SW-846 Hazardous Waste Analysis Method.
* UBTL is Utah Biomedical Test Laboratories, Salt Lake City, Utah

B. Hazardous Waste Survey

The first part of the survey involved the review of the base's Hazardous Waste Management Plan. From the review ten categories of waste generated on England AFB were established and a waste disposal survey form (Appendix C) to inventory waste disposal practices on base was developed. After this preliminary waste assessment, the survey team proceeded to visit all of the major industrial shops on England AFB to observe industrial activities, discuss chemical waste disposal practices with shop personnel, and hand out waste disposal survey forms.

The following individuals were contacted to discuss their respective areas of responsibility in the hazardous waste management program:

2Lt Thomas Rolka, Chief, Bioenvironmental Engineering, USAF Hosp/SGPB, AUTOVON 683-5357

Mr Cecil Lewis, Environmental Coordinator, 23 ABG/DEEV, AUTOVON 683-5795

Mr Bill Cullough, Supervisor of Base DRMO (Defense Reutilization and Marketing Office) Facility, AUTOVON 683-5302

TSgt Scott, Bldg 2519 (NDI Shop) Hazardous Waste Accumulation Site Manager, AUTOVON 683-5129

SSgt Peyton, Bldg 2104 (Jet Maintenance) Hazardous Waste Accumulation Site Manager, AUTOVON 683-5204

MSgt Clegg, Bldg 529 (76th AMU) Hazardous Waste Accumulation Site Manager, AUTOVON 683-2387

Mr Tucker, Bldg 2405 (Refueling Maintenance) Hazardous Waste Accumulation Site Manager, AUTOVON 683-5608

Based on the information received from the waste survey forms, a summary of the annual forecasted wastes generated on England AFB was compiled by category, and is included as Table 6. (See Appendix B for calculations.) Almost one-half of the wastes generated at England AFB are either waste oils or fuels. The remaining one-half is mostly comprised of waste paints and thinners, hydraulic and transmission fluids, and photographic developers and fixers. In fact 90% of all wastes fall into one of five categories (i.e., 1, 2, 3, 6, and 8).

TABLE 6: CATEGORIES OF WASTE GENERATED AT ENGLAND AFB

CATEGORY	PRODUCT	TOTAL (GAL/YR)	% TOTAL CATEGORIES 1-9
1	Waste Oil	4201.0	23.5
2	JP-4 Jet Fuel	4044.0	22.6
3	Waste Hydraulic and Transmission Fluid	2545.0	14.2
4	Waste Solvents	511.0	2.9
5	Automotive Fuel	252.0	1.4
6	Paint and Thinners	2681.0	15.0
7	Stripping Waste	864.0	4.8
8	Photo Waste	2660.0	14.9
9	NDI Waste	130.0	0.7
	TOTALS:	17888.0	100.0

IV. RESULTS AND DISCUSSION

A. Waste Disposal Practices

Management of waste oils and hazardous waste at England AFB is an efficient operation. All of these wastes, with the exception of waste oil from the vehicle maintenance and auto hobby shops, are collected and stored at four hazardous waste accumulation sites located throughout the installation. Each accumulation site is diked, covered, secure, and well-kept. The sites each contain four 250-gal above ground tanks for storage of waste oils and fuels. Waste oil from the vehicle maintenance and auto hobby shop is placed in the respective shop's 1200-gal or 600-gal tank. Each accumulation site is managed by a site manager who has received formal hazardous

waste management training from the base Environmental Coordinator. The individual managers are responsible for training personnel in their organization. The base Bioenvironmental Engineer does not participate in the training program.

Accumulation site managers keep monthly logs of the wastes generated, these are turned in to the base Environmental Coordinator. Waste oil is purchased through a contract for six cents per gallon, and is pumped out when 2000 gallons have been accumulated basewide. Site managers notify DRMO directly to arrange for hazardous waste pick-up. DRMO has had a disposal contract on-line for approximately one year. The contractor performs spot checks of the wastes' constituents. No waste had been rejected at the time of this survey.

The Base has aggressively pursued solvent waste minimization through a contract with Safety Kleen Corp. The use of PD-680 for parts cleaning has practically been eliminated because of this program. Additionally, DEEV personnel are investigating the possibility of using Safety Kleen for the removal of liquid paint waste.

B. Shop-by-Shop Description of Industrial Practices: The following is a shop-by-shop description of England AFB's industrial processes, the chemicals used in process, and the disposal practices for wastes generated by these processes:

1. 23rd EMS Corrosion Control — Building: 2502
   Shop Supervisor: TSgt Morris — AUTOVON: 683-2354

This shop is responsible for the refinishing of A-10 aircraft and support equipment. Additionally, shop personnel supervise the washing of A-10 aircraft. One aircraft is sanded and recoated about every two weeks. The shop operates two waterfall paint booths every day during two shifts. The booths are alternately drained every other week by the following procedure: liquid waste is discharged untreated into the sanitary sewer system while paint sludge is drummed as hazardous waste and stored at the Non-Destructive Inspection (NDI), bldg 2519, accumulation site (Figure 1).

Stripping operations are performed at the washrack and inside the shop. Small parts are stripped inside the shop on a table covered with a plastic cloth. The waste stripper is allowed to evaporate and the residual paint sludge is drummed and stored as hazardous waste. A phenolic stripper (Turco 5351) is applied by brush at the washrack. Rinsewater from the washrack discharges to an oil/water separator and flows into the sanitary sewer system. There is a 55-gallon hot dip tank next to the washrack which is used for parts cleaning. The contents are drummed every six months and stored at the bldg 2519 accumulation site as hazardous waste. Two Safety Kleen vats are used in the shop; one for spray paint gun cleaning (Figure 2) and one for parts cleaning. The vats contents are changed on a monthly basis.

Aircraft cleaning compound is diluted at a 4 to 1 ratio at the washrack. The average work load is three planes per day. Rinsewater passes through an oil/water separator and then into the sanitary sewer system. A new Corrosion Control Facility is in the design stage and will probably be built by fiscal year 1989.

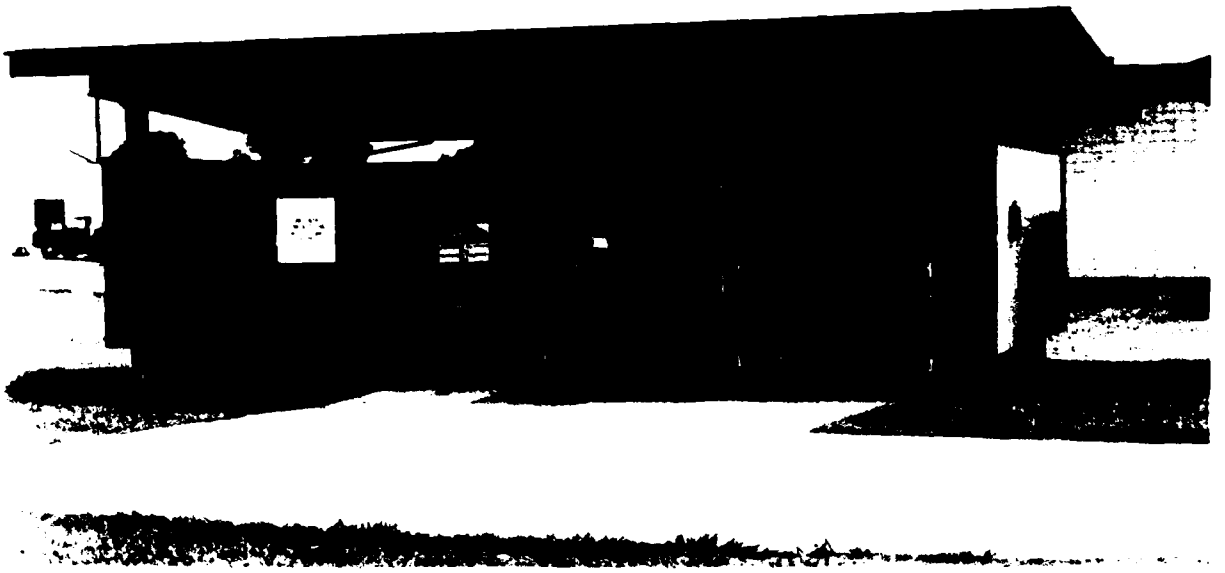

FIGURE 1. NDI ACCUMULATION SITE

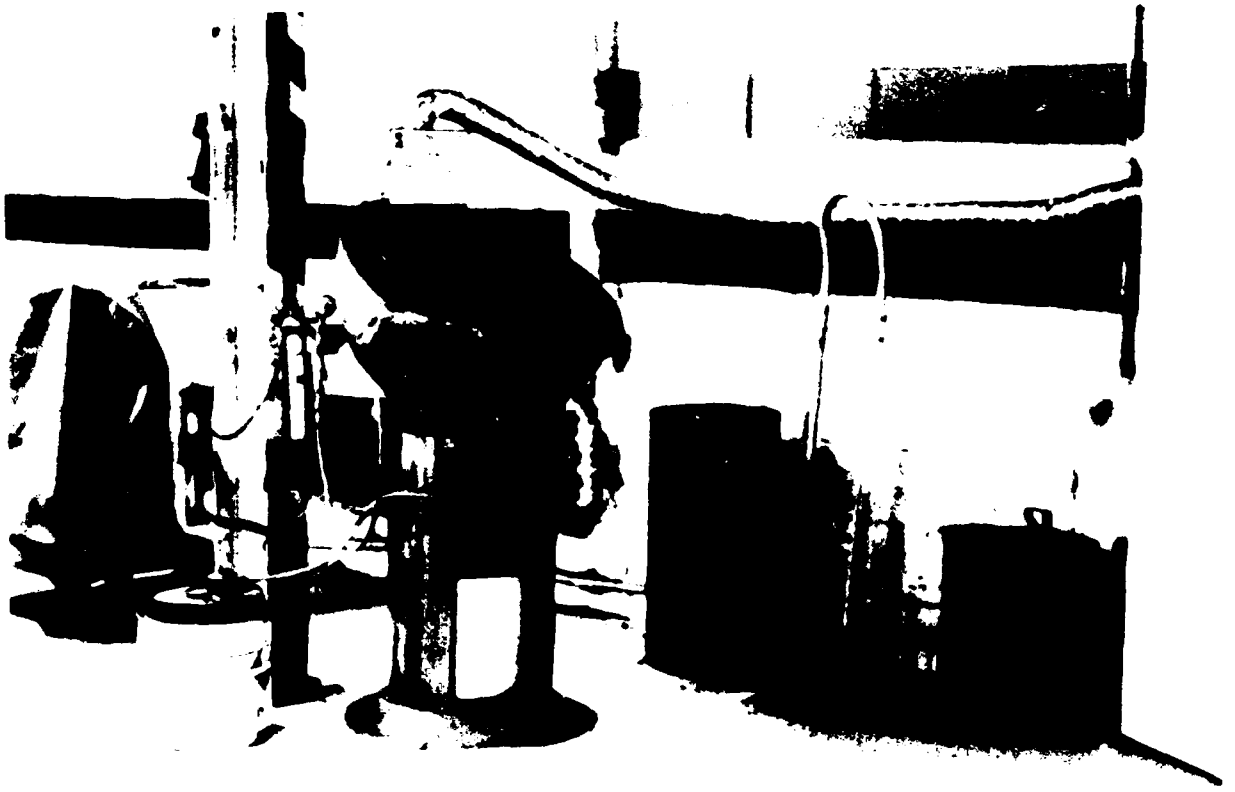

FIGURE 2. CORROSION CONTROL SHOP CLEANING VAT

2. 23rd EMS Metal Processing Shop — Building: 2502
   Shop Supervisor: Sgt Turney — AUTOVON: 683-2461

Shop personnel cut, braze, and forge parts, and weld ferrous and non-ferrous metals. The only waste generated by this shop is an oil solution (30% oil and 70% water) used to cool saws. This oil solution is changed every six months and drummed in a 10-gal barrel before transporting to the Bldg 2519 accumulation site.

3. 23rd CRS Pneudraulics Shop — Building: 2502
   Shop Supervisor: SSgt Shaw — AUTOVON: 683-5157

CRS Pneudraulics Shop cleans and tests components of hydraulic systems. The shop has a 25-gallon PD-680 tank for parts cleaning. Spent PD-680 is drummed every 2 to 3 months and taken to the Bldg 2104 (Jet Engine Maintenance) accumulation site (Figure 3). Waste hydraulic fluid from aircraft and the Hydrotest unit (about 25-gallons) are taken to the NDI accumulation site. Quantities of all contaminated wastes are tracked by the shop. Spent fixer from the shop's photo room is sent to the Photo Shop for silver recovery. The shop also periodically uses a floor polish remover which is washed down the storm drain.

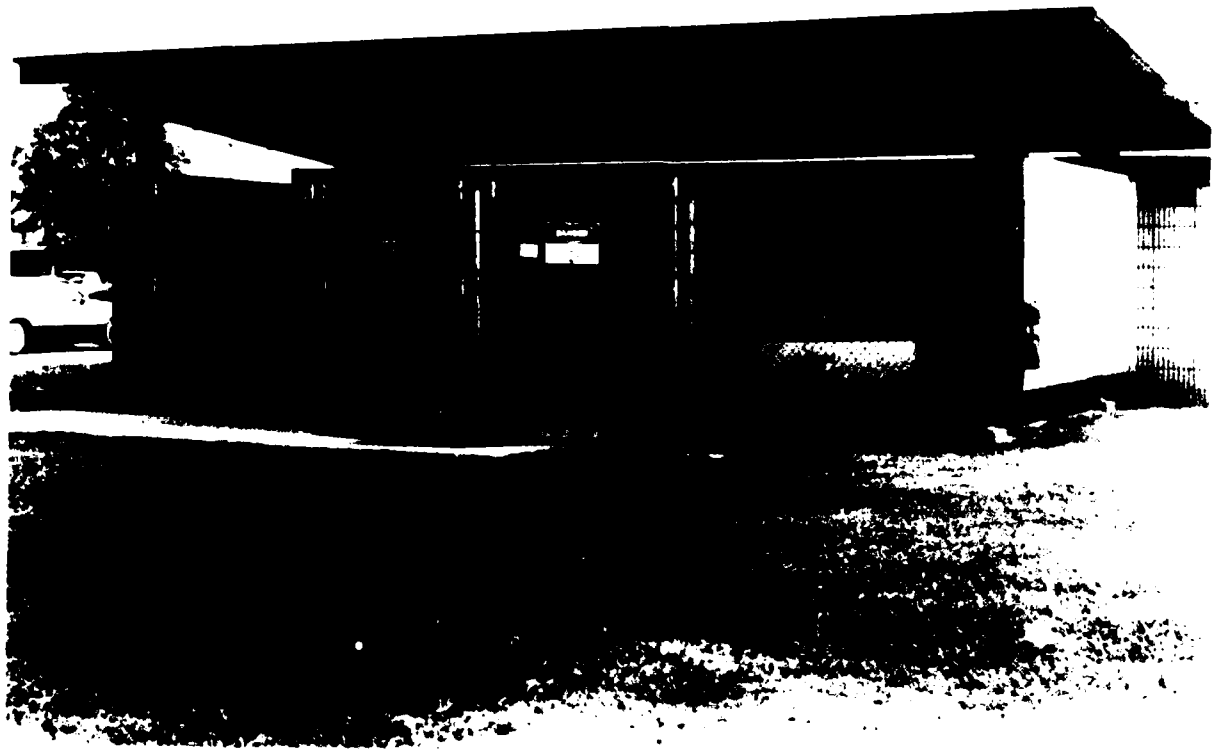

FIGURE 3. JET MAINTENANCE ACCUMULATION SITE

4. 23rd CSG Photo Lab/Armament Recording Lab — Building: 1009
   Shop Supervisor: SSgt Sweatt — AUTOVON: 683-5754

This shop exposes and processes color film and black & white film. The E-6 color processing room discharges approximately 21 gals of spent photo chemicals down the drain on a monthly basis. Generally, all film processing and printing chemicals (including black & white) goes down the drain into an underground sedimentation tank before discharging into the sanitary sewer. However, spent fixer goes through a silver recovery unit, with the silver subsequently turned in to DRMO at Ft Polk. The Armament Recording Lab has a color film processor with a silver recovery unit attached. Again, silver is turned in to DRMO at Ft Polk. All other chemicals are discharged down the drain into the underground sedimentation tank.

5. 23rd EMS NDI — Building: 2528
   Shop Supervisor: TSgt Scott — AUTOVON: 683-5111

23rd NDI shop personnel do both magnetic particle and penetrant inspection. The magnetic particle inspection is a closed system utilizing Magnaflux Magnaglow and iron filings with a large magnet to find flaws in aircraft parts. Spent Magnaflux solution is changed every six months, drummed and disposed of as mixed oil waste.

The penetrant inspection process (Figure 4) is an open system which uses a penetrant, emulsifier, and a rinse. Parts are sequentially dipped into the penetrant; removed; placed in the emulsifier; rinsed; and allowed to drip dry. The part is then sprayed with a developer and passed through a drying oven before inspection and final rinsing. The penetrant is changed every two years, drummed, and placed in the mixed oil waste tank at the NDI accumulation site. The emulsifier is changed every three years and drummed as a hazardous waste. However, the rinsed off emulsifier is discharged down the drain to the sanitary sewer system.

An oil analysis spectrometer is used to evaluate engine oil from aircraft. Trichlorofluoroethane is used to clean this machine and is contained in a closed system. Shop waste oil (about five gallons per month) is disposed of in the waste oil tank. A solvent containing 1,1,1-trichloroethane (in a spray can) (about 2 qts per month) is used for the portable penetrant inspection. Spent rags generated by this operation are turned in as hazardous waste, recycled, and exchanged on a one-to-one basis at the Structural Repair Shop.

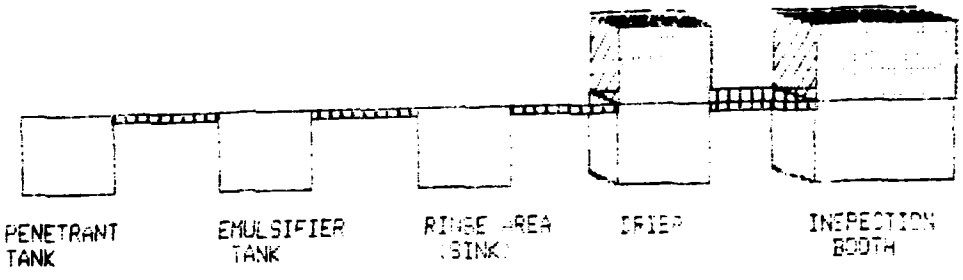

FIGURE 4. NDI PENETRANT INSPECTION SYSTEM

6. Phase Maintenance Shop — Building: 2502
Shop Supervisor: MSgt Higgins — AUTOVON: 683-5403

This shop performs scheduled phase maintenance on A-10 aircraft. Drip pans are used to catch oil and hydraulic fluid which is then transferred to bowsers and taken to the NDI accumulation site. Speedi-dri is used to soak up any spills.

7. 23rd CRS Electric/Battery Shop — Building: 2502
Shop Supervisor: TSgt Lawson — AUTOVON: 683-2516

Shop personnel bench check and repair electronic components, and service nickel-cadmium (Ni-Cd) and lead-acid batteries. About 100 Ni-Cd batteries per month are turned in to DRMO at Ft Polk. About 20 lead-acid batteries per month are capped and shorted out, then turned in to DRMO. No neutralization is performed in the shop.

8. 23rd EMS Arrnament System Shop — Building: 2108
Shop Supervisor: MSgt Salinas — AUTOVON: 683-5643

The 23rd Armament System is responsible for maintaining all armament equipment on the A-10 aircraft, including the GAU-8/A gun and all support equipment. This shop has three Safety Kleen vats for cleaning parts, i.e., gun parts, ALA parts, etc. These vats are changed every two weeks. There is an oil/water separator servicing this shop; however, it is said to be nonoperational. An inspection of this separator showed that it is full of an oily substance, although it could not be determined if the fluid was of recent origin.

9. 23rd CES Jet Maintenance Shop — Building: 2102
Shop Supervisor: TSgt Peyton — AUTOVON: 683-5205

This shop cleans and repairs TF-34 engine parts and bearings. The cleaning room has three tanks containing alkaline solution, Safety Kleen solvent, and hot water. The alkaline solvent is drained and drummed up on a quarterly basis and taken to the shop's accumulation site (Bldg 2104) as hazardous waste. The hot water tank drains into the oil/water separator and then to the sanitary sewer. The Safety Kleen vat is changed on a monthly basis. Also, 1,1,1-trichloro-ethane from the ultrasonic cleaner is changed quarterly and disposed of as hazardous waste.

The bearing room has four small vats containing Safety Kleen solvent in oil, carbon remover, 7808 engine oil and fingerprint remover. The waste from each of these vats is drummed separately as hazardous waste on a quarterly basis and taken to the shop's accumulation site. Three below-ground holding tanks on the outside of the building are no longer in use and have supposedly been drained and capped. Upon inspection, we found one of the tops to be broken and the tank full of water with an oily sheen.

10. 23rd EMS AGE Shop — Building: 120
Shop Supervisor: MSgt Swallows — AUTOVON: 683-2283

Shop personnel perform all maintenance and periodic inspections on 438 pieces of AGE equipment, including washing and minor spot painting. Waste synthetic, engine, and mineral oils are taken to the Jet Engine Maintenance accumulation site and put in a 250 gal storage tank. Quantities are logged on a daily basis by MSgt Swallows. There is a satellite storage area outside the shop for lube oil, hydraulic oil, and synthetic oil. This satellite storage area is not diked; consequently, rain can flow in and cause the oil trap to overflow. Spent spray paint cans are thrown in the trash. There is one 50-gal Safety Kleen unit which is changed monthly. Aircraft cleaning compound is used to wash equipment, and the rinsewater goes through an oil/water separator and then to the sanitary sewer. The separator is in disrepair. Storm runoff causes the sump to overflow and discharge oil into the storm drainage system.

11. Survival Equipment Shop — Building: 208
Shop Supervisor: SSgt Stroud — AUTOVON: 683-2462

This shop inspects and repairs parachutes and flotation equipment. Small quantities of solvent are used on the flotation devices in a brush-on application (MEK and Tetrachloroethylene). Waste solvent is put in a small can and thrown in the trash. Solvents are stored in a woodshed outside the shop.

12. 23 CRS Flight Simulator Shop — Building: 303
Shop Supervisor: MSgt Payne — AUTOVON: 683-5383

Personnel provide simulator training to pilots of the 23rd TFW, and perform the necessary maintenance on the electronic and mechanical systems of the A10-A operational flight trainer. Contaminated hydraulic fluid is taken to the Jet Engine Shop accumulation site and placed in the 250-gal tank. 1,1,1-Trichloroethane is used in a spray-on application to wipe up hydraulic leaks. Spent rags are thrown in the trash. Solvents are stored in a shed outside the building on the cement floor. No waste is generated in the cable repair area.

13. Transportation Vehicle Maintenance Shop — Building: 1707
Shop Supervisor: SSgt Spurgin — AUTOVON: 683-5563

This shop is responsible for the maintenance and repair of base vehicles. Waste oil and transmission fluid are taken to storage tanks adjacent to the shop (hydraulic and mineral oil waste, 1000 and 250-gal capacities respectively--See Figure 5). A monthly log is kept on quantities generated. Tanks are pumped out once every 4 to 6 months. Waste fuel goes to the refueling maintenance accumulation site, bldg 2405. The bay area has three Safety Kleen degreasing units which are changed monthly. In addition, there is a Safety Kleen carburetor cleaning unit which is changed monthly. Waste antifreeze is discharged to the sanitary sewer. The Battery Shop handles about 10-15 waste batteries per month. Waste batteries are sealed in plastic and turned in to DRMO. However, if a battery is cracked (about one in every 30) the battery is neutralized with baking soda before turn in.

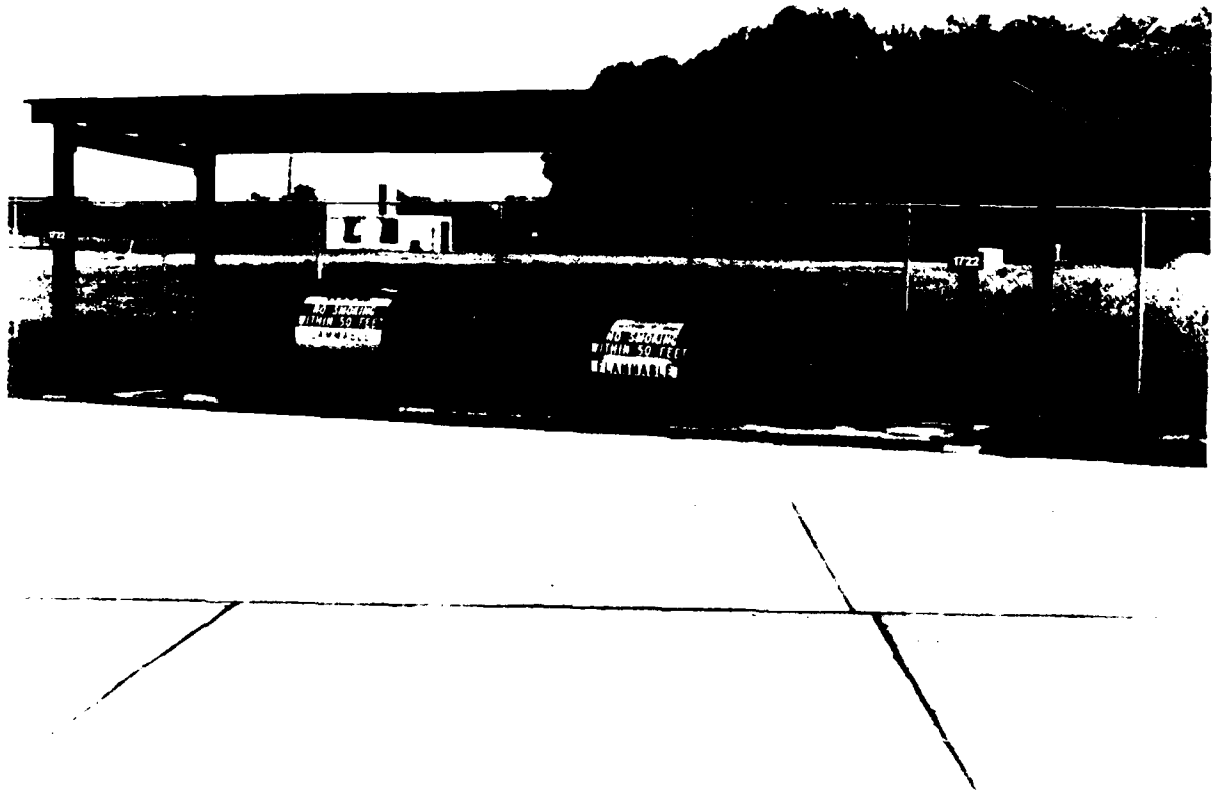

FIGURE 5. VEHICLE MAINTENANCE OIL STORAGE TANK

14. Trans Allied Trades Shop — Building: 1707
Shop Supervisor: Mr Howie — AUTOVON: 683-5804

Allied Trades is responsible for vehicle bodywork and painting. Paint is removed in a sandblasting operation. The shop operates a dry paint booth, with spent filters being put in plastic bags and subsequently thrown in the trash. Waste paints and thinners (5-10 gal quarterly) are drummed and sent to the refueling maintenance accumulation site. The shop is scheduled to convert to Safety Kleen solvent in October 1987.

15. Trans Refueling Maintenance — Building: 2401
Shop Supervisor: Mr Tucker — AUTOVON: 683-5608

Personnel perform all scheduled and unscheduled maintenance on all assigned refueling vehicles; to include repairs on both chassis and pumping systems. Waste generated is mainly petroleum products waste. Drained fuel is normally saved in barrels and returned to the system. Contaminated fuel is drummed as hazardous waste and stored at the shop's accumulation site, bldg 2405 (See Figure 6). Any fuel spilled during maintenance operations goes through the shop's oil/water separator before entering the sanitary sewer. Mr Tucker reports waste quantities to DEEV on a monthly basis. The shop is scheduled to use Safety Kleen in October 1987 for paint and thinner wastes.

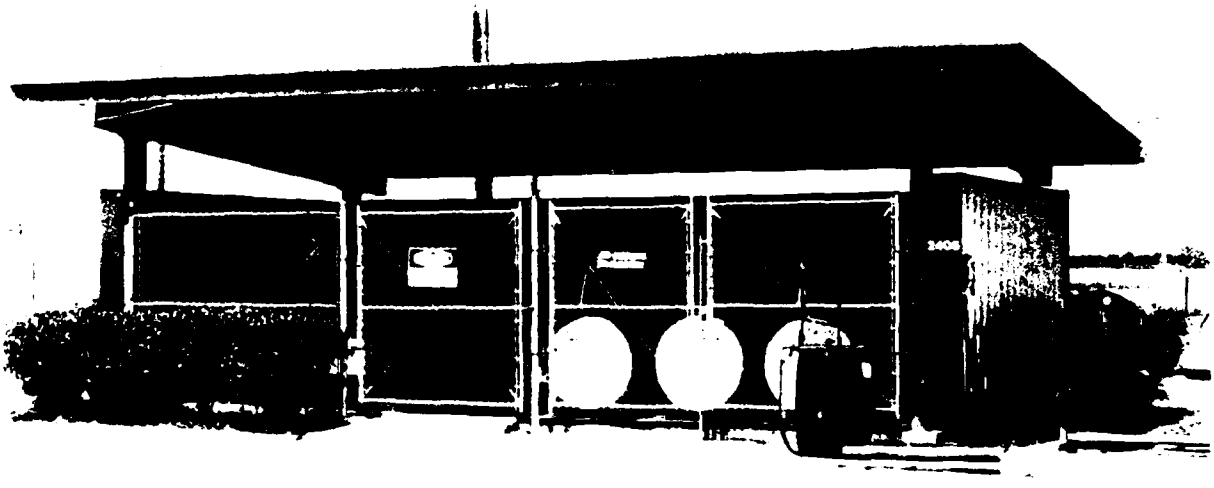

FIGURE 6. REFUELING MAINTENANCE ACCUMULATION SITE

16. Fuels Lab/Fuels Operation Shop, Building: 2403
Shop Supervisors: MSgt Fries & Byars AUTOVON: 683-5535

This shop is responsible for the issuing and sampling of JP-4, MOGAS, and Diesel fuels as well as washing of all refueling trucks. Detergent (Industrial Blue) is used for truck washing; however, there is no standard dilution ratio used, i.e., trial and error method. Rinsewater from the washrack goes through the shop's oil/water separator before entering the sanitary sewer. No other wastes are generated.

17. 23rd CES Liquid Fuels Shop Building: 1703
Shop Supervisor: TSgt Musick AUTOVON: 683-5759

Liquid Fuels personnel maintain stationary fuel systems, and clean above and below ground fuel tanks. The main source of waste is the JP-4 fuel/sludge mixture which is leftover from tank cleaning operations. Six tanks at bulk storage are cleaned every five years on a rotating basis. There are six 50,000-gal underground tanks which are inspected annually and physically entered every three years. About 200 to 300 gallons of waste are generated per tank (75% water, 25%

JP-4 and sludge) during cleaning. This waste is allowed to separate and the water phase is drained off and discharged into the sanitary sewer via the fire training pit oil/water separator without prior analysis. The waste JP-4 and sludge are drummed and taken to the refueling maintenance accumulation site (Bldg 2405) for disposal as hazardous waste.

18. 23rd CES Protective Coating Shop — Building: 1703
Shop Supervisor: Mr Martin — AUTOVON: 683-5814

This shop performs interior and exterior painting of all base facilities, and fabricates signs of all descriptions. Waste paint (latex and enamel) is drummed and sent to DRMO at Ft Polk as hazardous waste. Before transport, the drums are stored in an area near the CE compound fence. The storage area lacks a dike, a cover, and security. The shop operates a waterfall paint booth which is drained approximately three times per year. The water is discharged to the sanitary sewer without analysis, and the sludge is thrown into the garbage. A small amount of aluminum sign paint stripping is also performed.

19. Entomology Shop — Building: 1701
Shop Supervisor: Mr Jennings — AUTOVON: 683-5892

This shop does not generate any waste chemicals. Residual chemicals are mixed with other chemicals and used up in the field. Personnel perform vehicle washing outside the shop, or at the motor pool.

20. Auto Hobby Shop — Building: 1434
Shop Supervisor: Mr Parker — AUTOVON: 683-5841

Three Safety Kleen units are in this shop. Two of them are changed once a month, and the carburetor cleaning unit is changed twice a year. There is a 650 gallon spent oil tank located next to the shop which is pumped out by contractor on a quarterly basis. The shop operates a waterfall paint booth which is drained and cleaned weekly. The wastewater goes through an oil/water separator and then discharges to the sanitary sewer. No analysis is conducted prior to discharge. The waste paint sludge is thrown in the garbage. The shop uses Industrial Blue soap to clean the floors. The rinsewater discharges to the oil/water separator and then to the sewer. There are two empty underground storage tanks for spent oil which are no longer used by the shop.

21. 23rd EMS Armament Loading Shop — Building: 834
Shop Supervisor: SSgt Steinberg — AUTOVON: 683-5441

Shop personnel perform scheduled and unscheduled maintenance on ammunition loading assemblies, F-2 trailers, and auxillary drives. This shop generates waste lubricating oil which is put in a 5-gallon can and disposed of through the jet engine maintenance accumulation site.

22. 23rd CRS Fuel System Repair — Building: 814B
Shop Supervisor: MSgt Richardson — AUTOVON: 683-5237

This shop cleans and repairs aircraft fuel tanks, including removal and replacement of aircraft fuel cells, and certification and maintenance of external tanks. JP-4 is drained using pneumatic vacuum cleaners and put in 60-gallon bowsers. Maintenance Operations is then contacted to pick-up and transport the waste JP-4 to the refueling maintenance accumulation site. About 10 to 40 gals of waste fuel is generated per aircraft. Used rags are disposed of through the jet engine maintenance shop.

23. 23rd EMS Wheel and Tire Shop — Building: 814A
Shop Supervisor: MSgt Walker — AUTOVON: 683-5505

This shop performs all aircraft wheel and tire maintenance such as disassembling and completely rebuilding A-10 aircraft main and nose tires. Personnel process 60 to 80 tires per month by utilizing two Safety Kleen vats (130-gallon for wheels and 60-gallon for bearings). No strippers are used in the shop. MSgt Walker is investigating the possibility of adding an additive to the Safety Kleen solvent and/or using a heating unit to increase the cleaning effectiveness. Spent rags are turned in to Phase Maintenance on a one-to-one exchange program.

24. Fire Dept Shop — Building: 500
Shop Supervisor: MSgt Perry — AUTOVON: 683-5323

This shop uses dry chemicals, Aqueous Film Forming Foam (AFFF), oil, and hydraulic fluid. Waste oil is drained and placed in a 300-gallon above ground tank. The tank is pumped out every 2-3 months. Quantities are logged and a monthly report sent to DEEV. Waste hydraulic fluid from draining operations is sent to Refueling Maintenance for disposal.

Components are cleaned in the mechanical room using a 30-gal tank of 1,1,1-trichloroethane. The tank is drained every 6 months by Fire Dept personnel and drummed as hazardous waste at the refueling maintenance accumulation site. There is a sanitary sewer drain next to the tank. No 1,1,1-trichloroethane is stored on site; but is ordered through supply when needed.

AFFF spills can occur during refilling operations for fire training exercises, which are performed quarterly. Spilled AFFF discharges to an oil/water separator and then to the sanitary sewer. Between 300-500 gallons of JP-4 is burned at the fire training pit for each exercise. A two inch layer of water is placed down first, and then the JP-4 is put on top of the water layer. After the burn, the water is discharged to the fire training pit oil/water separator, and subsequently to the sanitary sewer.

25. 76th AMU Support Section Shop — Building: 525
Shop Supervisor: MSgt Clegg — AUTOVON: 683-2387

Very little waste oil is generated from this shop (3-4 qts per month). The two main categories of waste are hydraulic fluid and JP-4. Approximately 50-gallons of hydraulic fluid per

month is collected and taken to the Bldg 529 accumulation site to await disposal (Figure 7). Waste JP-4 is generated from bad aircraft fuel cells (20-30 gals per cell). The number of bad cells per month is highly variable. The JP-4 is brought in bowsers to the Bldg 529 accumulation site. The fuel is analyzed by POL and if contaminated is burned by the fire department. MSgt Clegg logs the quantities and gives a monthly report to DEEV. Waste fuel and oil bowsers are positioned next to the accumulation site, with a storm drain in close proximity. Evidence of hydraulic oil dumping was seen at this drain during the survey.

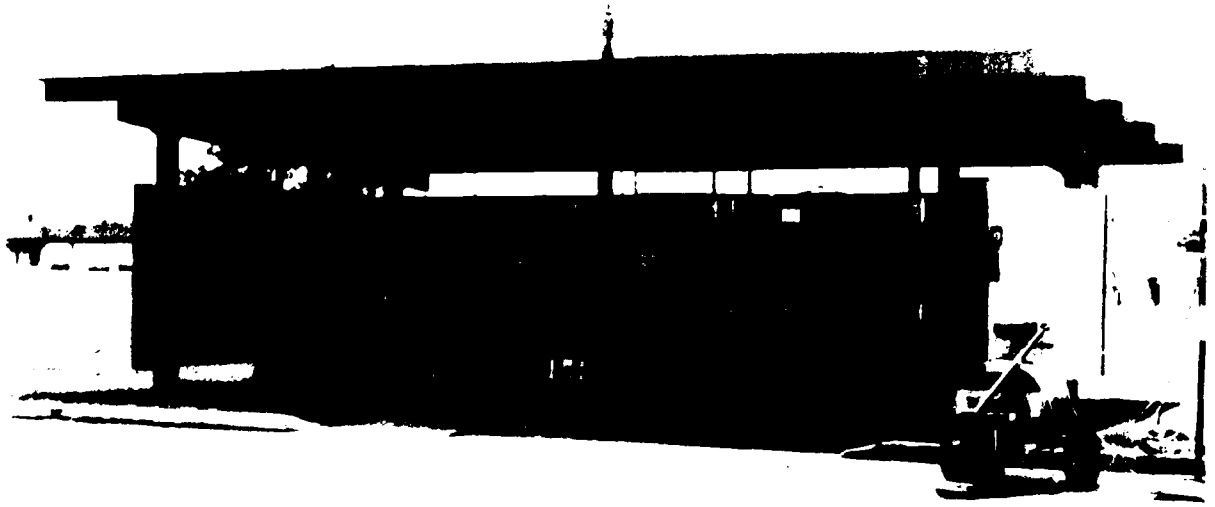

FIGURE 7. 76TH AMU ACCUMULATION SITE

26. 23rd CRS Jet Engine Test Cell Shop — Building: 2624
Shop Supervisor: MSgt Aimsworth — AUTOVON: 683-5640

All engine testing is performed on open pads. The old test cell building is only used to store equipment. The test cell pad generates washwater, soap, waste oil, and 10/10 oil.

Rinsewater during washing operations discharges to an oil/water separator and then to the sanitary sewer. Waste engine oil is taken to the Jet Engine Maintenance accumulation site. Dirty rags are disposed of in the trash. There is an old oil/water separator behind the old building which is not supposed to be in use, however, it is filled with oily waste.

27. 23rd EMS Combat Munitions Unit (CMU) Building: 1625
Shop Supervisor: MSgt White AUTOVON: 683-2442

Wastes from the 74th, 75th, and 76th CMUs are all collected at the 76th CMU (monitor is MSgt White). Each CMU generates small amounts of wastes. Personnel use 1,1,1-trichloroethane sprayed on rags to wipe down components. The rags are taken to linen exchange on a one-to-one turn in program. 76th CMU takes any waste to the refueling maintenance accumulation site.

28. POL Farm Building: 1323
Shop Supervisor: Lt Gardner AUTOVON: 683-2496

This organization stores and distributes fuels from above ground tanks in an earthen diked area. Water is drained from the above ground tanks on a weekly basis. The water is released to the ground, i.e., the spigot is turned on and then shut off when JP-4 appears. This practice causes the release of small amounts of JP-4 to the ground every time this operation is performed.

29. PMEL Shop, Building: 2527
Shop Supervisor: Amn Arnold AUTOVON: 683-5164

This shop generates about 10 lbs of waste mercury every 18 months. The mercury is turned in to DRMO at Ft Polk. They also use small amounts of solvents in a wipe on application. The spent rags are thrown into the trash.

30. DRMO Shop Building: 2530
Shop Supervisor: Mr Cullough AUTOVON: 683-5769

Mr Cullough goes out to inspect drums, labels, and markings for hazardous waste pick-up after being contacted by the accumulation site managers. A disposal contractor has been on line for about one year. The contractor does spot checks of waste constituents, and none have been rejected to date. The storage area for hazardous waste at DRMO is presently inadequate; however, this problem should be rectified when the prefabricated, portable, self-contained, hazardous waste storage buildings are put into use. Waste oil is purchased by contract for six cents per gallon. Oil is picked up when 2000 gallons are accumulated. Under the contract, removal has to be within 5 days after oral notification and 7 days after written notification.

C. Summary of General Waste Disposal Practices at England AFB:

The waste disposal practices for different categories of waste are summarized in this section. A summary of disposal practices by individual shops is contained in Appendix C.

a. Waste oils and fluids from the various shops are placed in bowsers or drums and transported to one of the four accumulation sites. They are then transferred to a 250-gallon storage tank which has been labeled for either mixed oil waste, hydraulic oil, mineral oil, or synthetic oil. When 2000 gallons of waste oil are accumulated basewide, the contractor comes and pumps out the tanks. The Vehicle Maintenance and Auto Hobby Shops have their own 1200 and 600-gallon tanks, respectively. These are also serviced by contract.

b. Waste fuel from the flight line is collected in bowsers and taken to the Bldg 525 accumulation site and placed in a storage tank. The fuel is tested by POL laboratory, and if contaminated, is burned by the Fire Department during fire training exercises. Waste fuel from refueling maintenance is placed in drums, tested, and returned to the system if uncontaminated; otherwise it is disposed of as hazardous waste.

c. A small portion of the waste solvents is drummed and disposed of as hazardous waste; however, most of these waste solvents are disposed of through contract with Safety Kleen Corporation.

d. Most paint wastes and thinners are drummed and disposed of as hazardous waste. Some sludges from paint booths are thrown into the garbage.

e. Stripping waste produced inside the shops is drummed and disposed of as hazardous waste. Rinsewater containing waste strippers from the Corrosion Control washrack passes through an oil/water separator before discharging into the sanitary sewer system.

f. Waste photo chemicals are drained into a settling tank before discharge into the sanitary sewer system. Spent fixers are sent through a silver recovery system prior to being discharged into the sanitary sewer. Recovered silver is taken to DRMO at Ft Polk.

g. For NDI wastes, the penetrant and Magnaflux chemicals are drummed and placed in the mixed oil waste storage tank at the NDI accumulation site. The emulsifier is drummed and disposed of as hazardous waste.

h. Rinsewater containing waste soap is discharged to oil/water separators before passing into the sanitary sewer system.

i. Spent rags are either turned in to linen exchange, drummed and disposed of as hazardous waste, or thrown in the trash.

j. Most spent spray paint and solvent cans are thrown in the trash.

D. Characterization Parameters: Testing results for wastewater characteristic parameters are listed in Appendix A. The following is a discussion of the significant results.

1. ICP Metal Screen Results: Complete analytical results from the ICP metals screen for sites 1-10 are presented in Appendix A, Table 1. Arsenic and cadmium were the only metals found exceeding Local Ordinance 27.5-8 levels. Arsenic was found in the CE Complex, the lift station servicing the complex, and the pond, at 32, 58, and 11 µg/L, respectively; the limit is 50 µg/L. Cadmium was found in the wastewater from the NDI building/corrosion control washrack separator (Figures 8 and 9), and the Jet Engine Repair building at 15 and 26 µg/L respectively; the limit is 20 µg/L.

Figure 8: CORROSION CONTROL WASHRACK

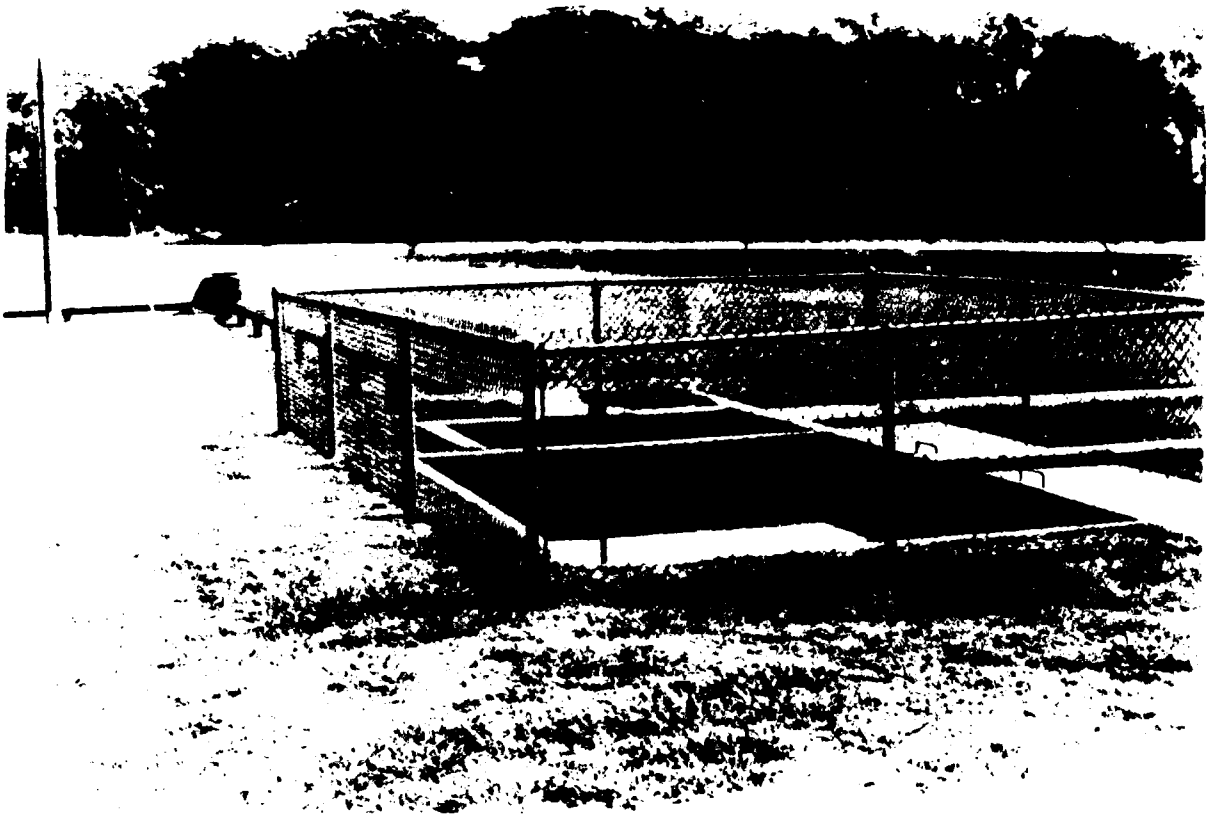

Figure 9: CORROSION CONTROL WASHRACK SEPARATOR

2. SW-846 8010 (Purgeable Halocarbons) Analytical Results: Complete SW-846 8010 analytical results are presented in Appendix A, Table 2. Only two sampling sites showed detectable concentrations of purgeable halocarbons: the photo lab (site 3) and the corrosion control building (site 7). Bromodichloromethane, chloroform, and dibromochloromethane were detected in the photo lab waste at concentrations less than 10 µg/L each. Bromoform, chloroform, and trichloroethylene were found in corrosion control wastes at concentrations less than 10 µg/L. Except for trichloroethylene, the detected volatile organic compounds (VOCs) are trihalomethanes, formed from the reaction of chlorine with organic precursors from the water supply.

3. SW-846 8020 (Purgeable Aromatic) Analytical Results: SW-846 8020 analytical results are presented in Appendix A, Table 3. Benzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, ethylbenzene, toluene, o-xylene, m-xylene, and p-xylene were found at concentrations exceeding their applicable limits. No benzene, gasoline or other flammable liquids

are permitted to be discharged. The CE main lift station, the CE complex (building 1703), the photo lab, the main base lift station (building 818), the corrosion control building (building 2502), jet engine repair (building 2102), and the jet engine test cell (building 2618) had detectable levels of one or more of these chemicals. The most significant concentrations of chlorobenzene occurred at the jet engine test cell (building 2618). These concentrations ranged from 47 µg/L to 95 µg/L. Chlorobenzenes are not fuel components, but are generally used for carbon removal. Fuel components ranging in concentration from trace amounts to 23 µg/L were found at the CE complex and the jet engine repair facility.

4. Phenols (EPA 604): Wastewater samples from sites 1-9 were tested for phenols using EPA Method 604. Detectable phenolic concentrations were found at the CE main lift station, the CE complex (building 1703), the NDI shop/corrosion control washrack, the pond by the country club, the main lift station (building 818), the corrosion control building, jet engine repair, and the vehicle maintenance building. The most significant concentrations (greater than 0.5 mg/L total) were found at the CE main lift station and complex (.571 and 1.177 mg/L respectively), the main lift station building 818 (a three day average of.577 mg/L), the jet engine repair facility (.876 mg/L), and the vehicle maintenance building (3.208 mg/L). Phenols present in wastewater are usually the result of paint stripping operations with phenolic paint strippers.

5. Organochlorine Insecticides and PCBs (SW-846 EPA Method 8080): Wastewater samples from sites 1-9 were analyzed using hazardous EPA Method for SW-846 8080. Detectable concentrations of pesticides were found in wastewater from sites 6 and 7; the main lift station (building 818), and corrosion control (building 2502). Dieldrin, Endrin, and beta BHC were detected in the main lift station wastewater at concentrations of 0.17, 0.24, and 0.18 µg/L, respectively; Dieldrin was detected in the corrosion control wastewater at .018 µg/L.

6. pH and Temperature: pH and temperature measurements taken from each wastewater sample are presented in Appendix A, Table 7. The pH of the sewage leaving the base through the main lift station was 7.78 (average value) and the pH of the waste from the CE complex lift station was 7.47. pH values from all other samples were below 9.0 and above 5.5. The wastewater tempera- ture found at the main lift station was 27.8°C (average value) and the wastewater temperature recorded at the CE main lift station was 26.5°C. All other temperature values recorded were below 35°C. All values for pH and temperature are within the limits set in the local ordinance.

7. Oil and Grease: Oil and grease analyses were run on samples from sites 1-10. The sewage leaving the base through the main lift station at building 818 had an average oil and grease concentration of 51.6 mg/L with a high of 96 and low of 4 mg/L. The sewage from the CE main lift station had a concentration of 19.6 mg/L. Concentrations from all other sites were below or equal to 63.2 mg/L. All results for oil and grease were below the 100 mg/L limit.

8. Surfactants: Surfactant analyses were performed on wastewater samples from sites 1, 4, 5, 6c, and 9. The sewage leaving the base through the main lift station at building 818 (site 6c) had a surfactant concentration of 1.9 mg/L. The sewage from the CE main lift station (site 1) had a

concentration of 0.9 mg/L. Concentrations from the NDI building/corrosion control washrack (site 4), the pond by the country club (site 5), and the vehicle maintenance building (site 9), were below or equal to 0.4 mg/L.

9. Fire Training Pit Separator: The design flow to the fire training pit oil/water separator was mathematically estimated using Stokes Formula and the dimensions of the separator. Stokes formula (3) is as follows:

$$V = g * d^{**2} * (S-1)/(18 * v)$$

in the equation: d = the diameter of the oil droplet
v = the kinematic viscosity
S = the specific gravity of the oil
g = 32.2 ft/sec^{**2}

The value assigned to the oil droplet diameter was 150 microns (4). The value chosen for kinematic viscosity was 9.829 * 10**-6 ft^{**2}/sec (5). The specific gravity of .751 was used for JP-4 (6). Sample calculations are presented in Appendix B.

With the rise velocity of an oil particle obtained from the Stokes equation and the dimensions of the separator, a design overflow rate of 138 GPM was established for the fire training pit separator. This rate is the maximum flow the separator can handle before it cannot even separate 150 micro particles. The separator discharge pump only operates at 35 GPM. The 8 inch pipe that connects the fire training pit to the separator can deliver as much as 317 GPM if a .04 percent grade is assumed (7).

E. Characteristic Hazardous Waste Results:

Hazardous waste results are presented in Table 4 of Appendix A.

1. Ignitability - The water sample from site 25, the Armament Shop, was the only wastewater found to be hazardous. The separator is closed off from the sewer system, but contained 100 percent petroleum distillates which were ignitable below 100 degrees Fahrenheit. Since the separator is disconnected from the sanitary sewer system, it is functioning as an underground storage tank for hazardous waste.

2. Corrosivity - No samples were found to be corrosive hazardous waste.

3. Reactivity - No samples were found to be reactive hazardous waste.

4. EP toxicity - No samples were found to be EP Toxic hazardous waste.

V. OBSERVATIONS AND CONCLUSIONS

A. Wastewater Survey

1. ICP Metals Results: Arsenic and cadmium were found in concentrations exceeding the discharge limitations presented in the ordinance. Arsenic was detected in the sewage from the CE main lift station at 58 µg/L; the limit is 50 µg/L. The likely source of arsenic at the CE Complex is the entomology shop. Arsenic is a component of pesticides. Rinse water from the cleaning of pesticide dispersion equipment drains into the sewer system. Cadmium was detected in the sewage from Jet Engine Repair, building 2102, at 26 µg/L; the limit is 20 µg/L. Cadmium is a component of aircraft parts and primers and is found whenever zinc is used. Normal cleaning and stripping operations performed at the jet engine repair facility can cause rinse water contaminated with cadmium to be discharged to the sewer system. The pH detected at this site was 8.15. This suggests that the cadmium present is in the dissolved state.(9) Reconnecting the oil/water separator located outside the building (which was disconnected at the time of the survey) may help trap sludge containing adsorbed cadmium; however, pretreatment would be necessary to lower the cadmium levels in the sewage by reducing the cadmium with calcium hydroxide.

2. Purgeable Halocarbons: England AFB has recently gone to Safety Kleen Corporation for their solvent disposal requirements. The results of the survey reflect this. Bromodichloromethane, chloroform, dibromochloromethane, bromoform, and trichloroethylene were detected in minute quantities from only two shops: the photo lab and the corrosion control building. The levels detected were below 10 µg/L. Except for trichloroethylene, the purgeable halocarbons were trihalomethanes (THMs) typically formed in the water supply after chlorination. The concentrations found do not pose a problem at this time.

3. Purgeable Aromatics: Aromatics were detected at seven sites. The detection of any aromatics in the England AFB wastewater technically is in violation of their ordinance. Benzene and chlorobenzenes were detected at the CE main lift station, the main lift station at building 818, the corrosion control building 2502, jet engine repair building 2102, and the jet engine test cell building 2618. The presence of benzene is not surprising because of the extensive fuel use at these locations. Chlorobenzenes are components of metal polishes, insecticides, heat transfer mediums, and can also be produced by the chlorination of toluene, a common component of fuels and solvents used for parts cleaning and degreasing. Toluene and xylenes were detected at the CE main lift station, the CE complex near building 1703, the photo lab, the main lift station at building 818, the corrosion control building 2502, and the jet engine repair building 2102.

Fuel components can enter the sewer system through a number of different paths including filling station spills, aircraft and vehicle washings, and minor discharges from oil/water separators. Although the permit allows no fuel components in the sewage, it is the City of Alexandria who determines if the base is in compliance. The fuel component levels found in the sewage are insignificant and will cause no problem to a sewage treatment plant.

4. Phenols (EPA 604): Phenol discharge requirements listed in Local Ordinance 27.5-8 do not identify a specific limitation. It is up to the City of Alexandria to determine if the phenolic levels present in the sewage present a problem to their sewage treatment plant.

5. Pesticides and PCBs (SW-846 8080): The pesticides found in the wastewater from the main lift station (building 818) and the corrosion control building are prohibited by Local Ordinance 27.5-8. However, the levels detected were below .25 µg/L.

6. pH and Temperature: The pH and temperature requirements of Local Ordinance 27.5-8 are currently being met by England AFB discharges.

7. Oil and Grease: Oil and Grease were found at Sites 1-10. The levels detected were below the limits of Local Ordinance 27.5-8.

8. Surfactants: Surfactants were detected at low levels (<2 mg/L) and should not cause a foaming problem at a properly operating sewage treatment plant.

9. Drainage from the fire training pit can easily flood the fire training pit separator. The fire training pit can be drained to the separator at rates up to 317 GPM. According to the Fire Chief, the drainage rate is controlled by sight. To avoid the possibility of overflow, the pit drainage rate should be throttled to below 35 GPM (the capacity of the discharge pump) to prevent flush out of the separator.

10. The separator located in front of building 2108 was supposedly disconnected from the sewer system at the time of the survey. However, the separator was filled with petroleum distillates. Since the separator has no outlet it is being used as an underground holding tank and will require notification to the EPA of its existence. It is subject to underground storage tank regulations.

11. Hazardous Waste:

a. Ignitability - Results of ignitability tests showed that the building 2108 armament shop separator contained ignitable hazardous waste (100 percent petroleum distillates ignitable below 100°F). The separator contents should be pumped out and disposed of as hazardous waste.

b. Corrosivity - No samples contained corrosive hazardous waste.

c. Reactivity - No samples contained reactive hazardous waste.

d. EP Toxicity - No samples contained toxic hazardous waste.

B. Hazardous Waste Survey

1. Notwithstanding several minor correctable problems, the hazardous waste management program at England AFB appears to be running very smoothly. The four hazardous waste accumulation sites are diked, covered, secured, and well-kept. Each of the site managers keeps a

monthly log detailing the amounts of wastes generated. These logs are turned in to Mr Lewis at DEEV. Additionally, each site manager appears to have a good understanding of the overall waste management program. The base has effectively minimized solvent waste handling through the widespread use of Safety Kleen cleaning vats. To date, no waste has been rejected by the disposal contractor.

2. Disposal practices at each of the paint booths on base are proceeding without adequate baseline information. Paint sludge from the Auto Hobby Shop and CES Protective Coating Shop is thrown in the trash without prior analysis. The sludge from the paint booths at Corrosion Control is disposed of as hazardous waste without documentation that the waste is indeed hazardous. Additionally, wastewater from each of the aforementioned booths is discharged to the sanitary sewer without an adequate characterization of its constituents. Filters from the dry paint booth at the Allied Trades shop are thrown in the trash.

3. There is a large variation basewide for spent rag disposal. A one-to-one turn in program is available through linen exchange, where the rags are sent to the V.A. hospital in Pineville LA for cleaning. Many organizations on base are not aware of this program, consequently, rags are being thrown in the trash, and in some instances drummed and disposed of as hazardous waste.

4. In general, shop personnel harbor gross misconceptions regarding the ability of oil/water separators to effectively handle various wastestreams. Most personnel are ignorant of the operating principles of the separators and do not understand the separators' limitations. This leads to the discharge of substances which the separators are not designed to handle, and thus harmful pollutants are discharged into the sanitary sewer system.

5. During clean-out operations of bulk fuel storage tanks the waste sludge/fuel/water mixture is allowed to settle so that the water and fuel will separate. The water is then siphoned off and discharged to the sanitary sewer system via the fire training pit oil/water separator. No analysis of the water is performed prior to discharge.

6. POL Farm personnel are releasing small quantities of JP-4 to the ground on a weekly basis due to their current practice of draining water from the fuel tanks without some type of catch container.

7. There was evidence of waste dumping or spillage in the storm drain next to the bldg 529 accumulation site. Bowsers for waste fuel, oil, and hydraulic fluid sit next to the storm drain (Figure 10).

8. The oil/water separator at the AGE shop is in disrepair. There is oil in the sump which is discharged to the storm drain during a good rainfall. A previous workorder (w/o #4603, 29 Oct 85) to repair the separator was disapproved.

FIGURE 10. EVIDENCE OF WASTE DUMPING IN STORM DRAIN

9. The oil/water separator behind the old test cell building is supposedly no longer operational, however, it is full of an oily waste.

10. Wastewater from the separator which adjoins the Armament Shop, Bldg 2108, is considered a hazardous waste. Samples from each compartment were found to be ignitable well below the 140°F standard. This separator is supposedly plugged and inactive.

11. The Fire Dept uses a vat of 1,1,1-trichloroethane for cleaning of various metal parts. This vat is currently located next to a floor drain. The vat is changed out by Fire Dept personnel, and any inadvertent spillage would be discharged directly to the sanitary sewer system. Additionally, personnel were not aware of the availability of Safety Kleen for possible solvent substitution.

12. The Entomology Shop has approximately 110 gal of waste chemicals awaiting disposal. DRMO is currently working out a contract to solve this problem.

13. Waste floor polish remover at the Pneudraulics Shop has historically been discharged to the storm drainage system.

14. Routine sampling of hazardous waste drums and industrial waste streams throughout the installation is not currently performed by Bioenvironmental Engineering Shop personnel.

15. The hazardous waste storage area at DRMO is presently inadequate (Figure 11). The area is not covered or secured. Rainwater causes the diked catch basin to overflow onto the surrounding pavement. According to Mr Cullough, these problems will be rectified when the base receives the pre-fabricated hazardous waste storage buildings in October 1987.

FIGURE 11. DRMO STORAGE SITE

16. Based on the widespread use of Safety Kleen units and the small amount of waste solvents generated on base, a solvent distillation unit appears unnecessary at this time.

17. Regulatory officials from the State of Louisiana targeted four issues requiring clarification and/or rectification during our 26 Jun 87 meeting.

a. Analysis of waste oil from the Lake Charles radar site has not been performed to date. The site may apply for status as a small quantity generator, however, a separate EPA identification number for the site is required before the application can be submitted. If analytical results indicate that the waste oil is hazardous, a separate hazardous waste handling and disposal program, complete with documentation, must be initiated. Otherwise, the waste can simply be disposed of as spent oil through an approved contract.

b. Any hazardous wastes found as a result of the USAFOEHL survey which do not discharge to the sanitary sewer system, must be compared to those listed on the hazardous waste notification form given to the State of Louisiana by England AFB in March of 1987. An amendment must be filed if any discrepancies are noted.

c. The closure plan for the excavation of underground storage tanks should include provisions for sampling residual wastes and pressure testing the tanks. The residual waste oil and sludge should be pumped out and analyzed for characteristic hazardous waste. Rinse water from cleaning out the tanks can be discharged to the sanitary sewer if analytical results are below the criteria listed in the State of Louisiana Hazardous Waste Regulations. If any tank fails the pressure test, then the surrounding soil must be sampled for hazardous waste, otherwise the tank can be excavated without soil sampling.

d. Oil/water separators containing hazardous waste will be considered hazardous waste generation points, and a written acknowledgement must be obtained from the City of Alexandria which states that the City is aware of the hazardous characteristics of the discharge in question.

VI. **RECOMMENDATIONS**

A. Wastewater Survey

1. A 24-hour composite wastewater sample should be taken at the CE Complex main lift station to confirm arsenic contamination. If the contamination is confirmed, the entomology shop vehicle washing operations should be modified to lower the amount of arsenical pesticide discharged to the sanitary sewer.

2. A 24-hour composite wastewater sample should be taken from the sewage outflow from the Jet Engine Repair facility to confirm cadmium contamination. The separator located outside the facility should be reconnected.

3. Periodic grab samples should be taken from the Jet Engine Test Cell while operations are in progress to confirm the presence of dichlorobenzene. Discharge of chlorinated benzenes into the sewer system must be discontinued in order to meet the City of Alexandria's wastewater discharge limitations.

4. Throttle the fire training pit discharge pipe to allow a maximum flowrate of 35 GPM into the fire training pit separator.

5. The separator located in front of building 2108, the Armament Shop, should be cleaned out immediately. The contents should be disposed of as hazardous waste.

B. Hazardous Waste Survey

1. A succession of four samples of the sludge and wastewater from each of the waterfall paint booths on England AFB should be taken to adequately characterize these wastes. Permament disposal practices will be established based on the sampling results. The samples should be taken during routine cleaning of the booths. Sludge samples should be analyzed for characteristic hazardous waste, and wastewater samples should be analyzed for those parameters listed in 40 CFR 433.15, Pretreatment Standards for Existing Sources, to determine if pretreatment is necessary before discharge to the sanitary sewer system. Until all sample results are received the wastes should be treated as hazardous, and drummed and disposed of accordingly.

2. Disposal practices for spent rags should be standardized basewide. The one-to-one turn in program available through linen exchange is the most environmentally acceptable.

3. A training program, integrating the technical expertise of the BEE and DEEV, should be initiated to educate shop personnel on the operating principles and limitations of oil/water separators. In particular, the possible regulatory and environmental consequences of bad disposal practices should be stressed, and personnel should be made aware of the particular properties and hazards associated with the use and disposal of each shops' wastes.

4. Wastewater from clean-out operations of bulk fuel storage tanks should be analyzed and compared to those parameters listed in 40 CFR 433.15, Pretreatment Standards for Existing Sources, before discharge to the sanitary sewer system. If the wastewater exceeds any of these parameters, pretreatment which will bring the wastewater in compliance must be accomplisned before discharge.

5. POL Farm personnel should stop the current practice of draining water from the stationary fuel storage tanks without a catch container. The water and fuel should be passed through a separator, either gravity or air flotation. The water could then be withdrawn and disposed of in the sanitary sewer system. The fuel could be tested to determine whether it should be returned to the tanks, recycled or burned at the fire training pit.

6. The bowsers for waste fuel, oil, and hydraulic fluid at the building 529 accumulation site should be repositioned away from the storm drain. Personnel should be made aware of the negative consequences of illegal dumping of wastes.

7. The oil/water separator at the AGE shop should be repaired as soon as possible to prevent further discharge of oily wastes to the storm drainage system.

8. The oil/water separator behind the old test cell building should be pumped out and closed. The waste should be drummed and disposed of as mixed oil waste.

9. The contents of the separator adjoining the Armament Shop should be pumped out, drummed, and disposed of as hazardous waste. The contents of each compartment is an immediate fire hazard, having exhibited ignitability at or below 95°F. The separator should be valved off to insure that it cannot accept further discharges.

10. DEEV personnel should investigate the possibility of substituting a Safety Kleen solvent vat for the 1,1,1-trichloroethane vat used for parts cleaning at the Fire Department. In the interim, Fire Department personnel should reposition their 1,1,1-trichloroethane vat away from the floor drain to prevent inadvertent spillage from entering the sanitary sewer system during change-outs.

11. Waste floor polish remover should be discharged to the sanitary sewer and not to the storm drainage system.

12. Bioenvironmental Engineering Section personnel should establish a routine sampling protocol for hazardous waste and industrial waste streams. This would provide an historical data base from which long term wastewater and hazardous waste discharge and disposal practices could be recommended. An example Waste Analysis Plan is shown in Appendix F.

13. England AFB should petition the State of Louisiana for a separate EPA identification number for the bases' Lake Charles Radar site, so that the site may apply for status as a small quantity generator. In the interim, four successive monthly samples of waste oil from the site should be analyzed for characteristic hazardous waste and major components to determine the waste's disposal category.

14. England AFB DEEV personnel should compare the hazardous wastes identified in this report which do not discharge to the sanitary sewer system with those listed on the hazardous waste notification form given to State of Louisiana Regulatory Officials in March of 1987. If any discrepancies are found, an amendment should be filed.

15. The base is in the process of writing a maintenance contract for the annual clean-out of the oil/water separators (to include analysis of content for hazardous waste). The base should consider more frequent clean-out for some separators based on usage and a periodic inspection program.

16. A satellite hazardous waste storage site should be constructed adjacent to the CES Protective Coating Shop for storage of waste paint prior to transport to DRMO. The site should be diked, covered, and secure.

VII. **REFERENCES**

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10. "Hazardous Waste Management Plan, England Air Force Base, Louisiana," 1987.

11. "Hazardous Waste Abatement Plan, England Air Force Base, Louisiana," 1987.

12. State of Louisiana Hazardous Waste Regulations

13. RCRA Interim Guidance Amendment.

APPENDIX A

ANALYTICAL RESULTS

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Table 1: ICP Metals Screen, Oil & Grease, and MBAS Analytical Results

Parameter	Site Numbers						
	1	2	3	4	5	6a	6b
oil & grease (mg/L)	19.6	19.6	<0.3	1.3	11.6	4.0	96.0
arsenic (µg/L)	58	32	<10	<10	11	<10	<10
cadmium "	<10	<10	<10	15	<10	<10	<10
chromium "	<50	<50	<50	<50	<50	<50	<50
copper "	48	47	242	143	<50	<50	50
lead "	29	84	<20	<20	<20	<20	27
mercury "	<1	<1	<1	<1	<1	<1	<1
nickel "	<50	<50	<50	<50	<50	<50	<50
selenium "	<10	<10	<10	<10	<10	<10	<10
silver "	<10	43	<10	<10	<10	<10	<10
zinc "	250	337	79	217	<50	1206	221
antimony "	<10	<10	<10	<10	<10	<10	<10
beryllium "	<10	<10	<10	<10	<10	<10	<10
thallium "	<10	<10	<10	<10	<10	<10	<10
MBAS	*0.9*		*0.3*	*0.1*			

	6c	7	8	9
oil & grease (mg/L)	54.8	2.4	58.8	63.2
arsenic (µg/L)	<10	<10	<10	<10
cadmium "	<10	<10	26	<10
chromium "	<50	<50	<50	<50
copper "	63	<20	130	101
lead "	85	<20	255	39
mercury "	<1	<1	<1	<1
nickel "	<50	<50	<50	<50
selenium "	<10	<10	<10	<10
silver "	12	<10	<10	<10
zinc "	1071	259	485	356
antimony "	<10	<10	<10	<10
beryllium "	<10	<10	<10	<10
thallium "	<10	<10	<10	<10
MBAS	1.9			0.4

Table 2: SW-846 8010 Analytical Results μg/L)

Parameter	Site Numbers (1,2,4,5,6,8,9,10)	3	7
Bromodichloromethane	-	2.7	-
Bromoform	-	-	3.1
Bromomethane	-	-	-
Carbon tetrachloride	-	-	-
Chlorobenzene	-	-	-
Chloroethane	-	-	-
2-Chloroethylvinyl ether	-	-	-
Chloroform	-	7.1	8.8
Chloromethane	-	-	-
Dibromochloromethane	-	2.6	-
1,2-Dichlorobenzene	-	-	-
1,3-Dichlorobenzene	-	-	-
1,4-Dichlorobenzene	-	-	-
Dichlorofluoromethane	-	-	-
1,1-Dichloroethane	-	-	-
1,2-Dichloroethane	-	-	-
Trans 1,2-dichloroethene	-	-	-
1,2-Dichloropropene	-	-	-
Cis 1,3-dichloropropene	-	-	-
Trans 1,3-dichloropropene	-	-	-
Methylene chloride	-	-	-
1,1,2,2-Tetrachloroethane	-	-	-
Tetrachloroethylene	-	-	-
1,1,1-Trichloroethane	-	-	-
1,1,2-Trichloroethane	-	-	-
Trichloroethylene	-	-	2.6
Trichlorofluoromethane	-	-	-
Vinyl chloride	-	-	-
Benzyl chloride	-	-	-
Bis (2-chloroethoxy) methane	-	-	-
Bis (2-chloroisopropyl) ether	-	-	-
Bromobenzene	-	-	-
Chloracetaldehyde	-	-	-
Chloral	-	-	-
Chlorotoluene	-	-	-
Dichlorodifluoromethane	-	-	-
1,1,1,2-Tetrachloroethane	-	-	-
Trichloropropane	-	-	-
Chloromethyl methyl-ether	-	-	-
Dichloromethane	-	-	-

NOTE: - represents "not detected"

Table 3: SW-846 8020 Analytical Results

Parameter	Site Numbers					
	1	2	3	4	5	6
Benzene	2.7	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-	-
1,3-Dichlorobenzene	-	-	-	-	-	-
1,4-Dichlorobenzene	-	-	-	-	-	19
Ethylbenzene	6.6	-	-	-	-	-
Toluene	16	7.5	tr	-	-	-
p-Xylene	4.9	-	-	-	-	-
m-Xylene	23	4.2	-	-	-	-
o-Xylene	17	3.2	-	-	-	-

	7	8	9	10
Benzene	-	26	-	-
1,2-Dichlorobenzene	-	-	-	57
1,3-Dichlorobenzene	-	21	-	95
1,4-Dichlorobenzene	-	-	-	47
Ethylbenzene	2.2	-	-	-
Toluene	tr	-	-	-
p-Xylene	tr	-	-	-
m-Xylene	tr	16	-	-
o-Xylene	tr	6.7	-	-

NOTE: - represents "not detected"
tr represents trace amounts detected

Table 4: Hazardous Waste Results

Site	EP Tox (mg/L) As	Ba	Cd	Cr	Pb	Hg	Ag	Se	Ig. DRGF	Cor. pH	Reac. CN/S	Class
11	<.01	<1.0	<.01	<.05	0.04	<.001	<.01	<.01	no	6.0	none	NH
11(s)	<.01	<1.0	0.02	<.05	0.04	<.001	<.01	<.01	no	6.0	none	NH
12	<.01	<1.0	<.01	<.05	0.08	<.001	<.01	<.01	no	6.0	none	NH
12(s)	<.01	<1.0	<.01	<.05	0.06	<.001	<.01	<.01	no	6.0	none	NH
13	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
13(s)	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
14	-	-	-	-	-	-	-	-	no	6.0	none	NH
14(s)	<.01	<1.0	<.01	0.06	<.02	<.001	<.01	<.01	no	6.0	none	NH
15	<.01	<1.0	0.18	<.05	0.05	<.001	<.01	<.01	no	5.0	none	NH
15(s)	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	7.0	none	NH
16	<.01	<1.0	<.01	<.05	0.03	<.001	<.01	<.01	no	6.0	none	NH
16(s)	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
17	<.01	<1.0	<.01	<.05	0.02	<.001	<.01	<.01	no	6.0	none	NH
17(s)	<.01	<1.0	<.01	<.05	0.02	<.001	<.01	<.01	no	6.0	none	NH
18	<.01	<1.0	0.05	<.05	0.05	<.001	<.01	<.01	no	6.0	none	NH
18(s)	<.01	<1.0	0.05	0.07	0.58	<.001	<.01	<.01	no	6.0	none	NH
19	0.02	<1.0	0.01	0.05	0.25	<.001	<.01	<.01	no	6.0	none	NH
19(s)	0.02	<1.0	<.01	<.05	0.06	<.001	<.01	<.01	no	5.5	none	NH
20	<.01	<1.0	<.01	0.06	0.02	<.001	<.01	<.01	no	6.0	none	NH
20(s)	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	7.0	none	NH
21	<.01	<1.0	<.01	<.05	0.07	<.001	<.01	<.01	no	6.0	none	NH
21(s)	<.01	<1.0	<.01	<.05	0.02	<.001	<.01	<.01	no	-	none	NH
22	<.01	<1.0	0.04	<.05	0.06	<.001	<.01	<.01	no	6.0	none	NH
22(s)	<.01	<1.0	<.01	0.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
23	<.01	<1.0	<.01	<.05	0.03	<.001	<.01	<.01	no	6.0	none	NH
23(s)	<.01	<1.0	<.01	<.05	0.02	<.001	<.01	<.01	no	6.0	none	NH
24	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
24(s)	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
25(L)		-	-	-	-	-	-	90		-	none	HAZ
25(R)	-	-	-	-	-	-	-	95		-	none	HAZ
26	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
27	<.01	<1.0	0.03	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
27(s)	<.01	<1.0	<.01	0.05	0.04	<.001	<.01	<.01	no	6.0	none	NH
28	<.01	1.14	<.01	0.16	0.04	<.001	<.01	<.01	no	6.0	none	NH
28(s)	<.01	3.20	<.01	0.16	0.09	<.001	<.01	<.01	no	6.0	none	NH
29	<.01	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH
29(s)	<.01	1.47	<.01	0.07	<.02	<.001	<.01	<.01	no	6.0	none	NH
30(s)	0.02	<1.0	<.01	<.05	<.02	<.001	<.01	<.01	no	6.0	none	NH

NOTE: - represents "not analyzed"
NH represents "not hazardous"
HAZ represents "hazardous"

Table 5: Phenols (EPA Method 604) (µg/L)

Parameter	1	2	3	4	5	6a	6b
Phenol	63	110	ND	18	ND	37	32
2-Chlorophenol	88	180	ND	9	ND	110	130
2-Methylphenol	NR	NR	NR	NR	NR	NR	NR
4-Methylphenol	NR	NR	NR	NR	NR	NR	NR
2-Nitrophenol	59	110	ND	11	ND	19	10
2,4-Dimethylphenol	94	100	ND	ND	ND	49	65
2,4-Dichlorophenol	21	290	ND	12	ND	67	36
4-Chloro-3-methylphenol	22	30	ND	8	ND	ND	ND
2,4,6-Trichlorophenol	120	220	ND	58	ND	140	29
2,4,5-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrophenol	ND	ND	ND	ND	ND	ND	ND
4-Nitrophenol	54	17	ND	6	9	7	7
2,6-Dinitro-2-methylphenol	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	50	120	ND	220	20	ND	120
Phenol	110	ND	70	550	NR		
2-Chlorophenol	110	24	9	820	NR		
2-Methylphenol	NR	NR	NR	NR	NR		
4-Methylphenol	NR	NR	NR	NR	NR		
2-Nitrophenol	ND	ND	70	360	NR		
2,4-Dimethylphenol	120	ND	42	710	NR		
2,4-Dichlorophenol	110	ND	140	ND	NR		
4-Chloro-3-methylphenol	27	ND	19	ND	NR		
2,4,6-Trichlorophenol	180	ND	120	330	NR		
2,4,5-Trichlorophenol	NR	NR	NR	NR	NR		
2,4-Dinitrophenol	ND	ND	ND	ND	NR		
4-Nitrophenol	25	ND	26	68	NR		
2,6-Dinitro-2-methylphenol	ND	ND	ND	ND	NR		
Pentachlorophenol	190	30	380	370	NR		

NOTE: ND represents "not detected"
NR represents "not reported"

Table 6: SW-846 Method 8080 (Organochlorine Insecticides and PCBs) (µg/L)

Parameter	(1,2,3,4,5,6b,6c,8,9)	6a	7
Aldrin	ND	ND	ND
DDD	ND	ND	ND
DDE	ND	ND	ND
Dieldrin	ND	0.17	0.018
Endrin	ND	0.24	ND
Heptachlor	ND	ND	ND
Heptachlor Epoxide	ND	ND	ND
Lindane	ND	ND	ND
p,pl-DDT	ND	ND	ND
Endosulfan I	ND	ND	ND
Endosulfan II	ND	ND	ND
Endosulfan Sulfate	ND	ND	ND
Endrin Aldehyde	ND	ND	ND
Chlordane	ND	ND	ND
alpha-BHC	ND	ND	ND
delta-BHC	ND	ND	ND
Toxaphene	ND	ND	ND
Kepone	ND	ND	ND
Methoxychlor	ND	ND	ND
PCB-1016	ND	ND	ND
PCB-1221	ND	ND	ND
PCB-1232	ND	ND	ND
PCB-1242	ND	ND	ND
PCB-1248	ND	ND	ND
PCB-1254	ND	ND	ND
PCB-1260	ND	ND	ND

NOTE: ND represents "not detected"

Table 7: England AFB pH and Temperature Results

Site	pH	Temperature
1	7.47	26.5
2	-	-
3	7.75	27.0
4	7.80	26.5
5	-	-
6	7.75	28.0
7	8.03	25.2
8	8.07	26.2
9	-	-
10	-	-
11	7.4	34.5
11s	7.27	34.0
12	7.10	30.0
12s	6.60	29.0
13	6.70	30.0
13s	6.60	29.0
14	6.81	29.0
14s	6.87	28 0
15	7.30	31.0
15s	7.12	31.0
16	7.30	28.5
16s	7.36	26.0
17	7.64	29.0
17s	7.54	26.5
18	7.40	31.0
18s	6.30	32.0
19	7.90	28.0
19s	7.80	27.5
20	8.17	29.5
20s	8.25	30.5
21	7.38	30.0
21s	7.43	30.0
22	7.38	30.5
22s	7.60	29.5
23	7.48	31.0
23s	7.32	30.5
24	6.70	28.5
24s	7.46	27.5
25	6.80	28.0
26	-	-
27	7.81	27.5
27s	7.98	29.0
28	7.98	27.5
29	8.05	28.0
30	7.08	31.0
30s	7.90	31.5

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APPENDIX B

Sample Calculation

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Sample Calculations

rise velocity:

V = g * d**2 * (S-1) / (18 * v)

V = 32.2 * (.015**2) * (.751-1) / ((18 * 9.829EE-6) * (2.54**2) * 144)

V = .01098 ft/s (rise velocity)

Depth = 5A

T = D ÷ T

T = 5 ft ÷ .1098 ft/S

Time = 45.54 sec

Maximum volumetric flowrate:

Q = V ÷ T

Q = 6 ft x 4.67 ft x 5 ft ÷ 45.54 sec

Q = .30744 ft**3/s = 138 GPM

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APPENDIX C

Waste Disposal Survey Form

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APPENDIX C

Shop: _____ Building Number: _____
Shop Supervisor: _____ Autovon: _____

Shop Description: _____

CATEGORIES OF WASTE AND DISPOSAL METHODS

TYPE OF WASTE	DISPOSAL METHOD *(D,DD)	AMOUNT GENERATED (per month)	COMMENTS
1. PAINTS AND THINNERS			
2. DEVELOPER WASTES			
3. $ STRIPPING WASTE			
4. BATTERY ACID			
5. $ SOAPS			
6. $ OILS			
7. FLUIDS			
Transmission			
Brake, Hydraulic			
8. FUELS			
Jet			
Automotive			
9. ANTIFREEZE			
10. $ SOLVENTS			
11.			

$ specify the types used on next page
* USED DISPOSAL CODES BELOW:

D-DRUMMED
DD-DOWN DRAIN
NDD-NEUTRALIZED FIRST THEN PLACED DOWN DRAIN
RDD-RINSED OFF AND RINSEWATER GOES DOWN DRAIN
SRDD-SILVER RECOVERY UNIT THEN DOWN DRAIN
RTT-RETURNED TO FUEL TANKS
FTP-GOES TO FIRE TRAINING PIT
UIP-USED IN PROCESS
KIT-KEPT IN TANK
O-OTHER (specify)
E-EVAPORATED
NA-NOT APPLICABLE

SPECIFIC CHEMICALS USED

STRIPPERS

Name of Stripper	Manufacturer	Amt used	National Stock Number

SOLVENTS

Name of Solvent	Manufacturer	Amt used	National Stock Number

SOAPS

Name of Soap	Manufacturer	Amt used	National Stock Number

OILS

Name of Oil	Manufacture	Amt used	Disposal Method

Name of Oil	Manufacture	Amt used	Disposal Method

Shop supervisors signature:_____

APPENDIX D

Summary Of Wastes Generated By England AFB

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SUMMARY OF WASTES GENERATED AT ENGLAND AFB

CATEGORY 1: WASTE OIL

SHOP	PRODUCT	YEARLY QTY (GALS)
EMS Metal Processing	Lube Oil	10.0
EMS NDI	7808 Oil	60.0
Phase Maintenance	7808 Oil	1100.0
CRS Electric/Battery	Lube Oil	36.0
CES Jet Maintenance	7808 Oil	144.0
EMS AGE	7808, Engine Oils	900.0
Survival Equipment	Mineral Oil	3.0
CRS Flight Simulator	30W Motor Oil	1.0
Trans Vehicle Maintenance	Motor Oils	500.0
Trans Refueling Maintenance	Engine and Gear Oils	240.0
Auto Hobby	Motor Oils	900.0
EMS Armament Loading	Lube Oil	7.0
CES Fire Dept	Engine Oils	144.0
76th AMU Support Section	7808 Oil	120.0
CRS Test Cell	Mil 7808, 83282, 6081	36.0
	TOTAL:	4201.0

CATEGORY 2: JP-4 JET FUEL

SHOP	PRODUCT	YEARLY QTY (GALS)
Trans Refueling Maintenance	JP-4	600.0
CES Liquid Fuels	JP-4	600.0
CRS Fuel System Repair	JP-4	900.0
76th AMU Support Section	JP-4	1800.0
CRS Test Cell	JP-4	144.0
	TOTAL:	4044.0

CATEGORY 3: WASTE HYDRAULIC AND TRANSMISSION FLUID

SHOP	PRODUCT	YEARLY QTY (GALS)
CRS Pneudraulics	Hydraulic	300.0
Phase Maintenance	Hydraulic	25.0
EMS AGE	Transmission, Hydraulic	480.0
CRS Flight Simulator	Hydraulic	150.0
Trans Vehicle Maintenance	Transmission and Hydraulic	840.0
Trans Refueling Maintenance	Transmission	72.0
Auto Hobby	Transmission	300.0
CES Fire Dept	Transmission and Hydraulic	12.0
76th AMU Support Section	Hydraulic	360.0
CRS Test Cell	Hydraulic	6.0
	TOTAL:	2545.0

CATEGORY 4: WASTE SOLVENTS

SHOP	PRODUCT	YEARLY QTY (GALS)
EMS Corrosion Control	MEK, Toluene, Thinners	160.0
CRS Pneudraulics	PD-680	150.0
EMS NDI	Trichlorotrifluoroethane	6.0
CES Jet Maintenance	Fingerprint remover, PD-680, Carbon Remover, Trichloroethane	84.0
CRS Flight Simulator	Toluene, Trichloroethane, Acetone	3.0
CRS Fuel System Repair	MEK	12.0
CES Fire Dept	Trichloroethane, Degreaser	90.0
76th Combat Munitions	PD-680	6.0
	TOTAL:	511.0

CATEGORY 5: AUTOMOTIVE FUEL

SHOP	PRODUCT	YEARLY QTY (GALS)
Trans Vehicle Maintenance	Auto Fuel	240.0
Trans Refueling Maintenance	Auto Fuel	12.0
	TOTAL:	252.0

CATEGORY 6: PAINT AND THINNER WASTE

SHOP	PRODUCT	YEARLY QTY (GALS)
EMS Corrosion Control	Paints and Thinners	2400.0
Trans Allied Trades	Paints and Thinners	24.0
CES Protective Coating	Paints and Thinners	120.0
Auto Hobby	Paints	12.0
EMS Armament Loading	Paints and Thinners	5.0
76th Combat Munitions	Paints and Thinners	120.0
	TOTAL:	2681.0

CATEGORY 7: STRIPPING WASTE

SHOP	PRODUCT	YEARLY QTY (GALS)
EMS Corrosion Control	Turco, Mil-R-83936B, Paint and Lacquer Remover	720.0
CRS Pneudraulics	Floor Polish Remover	24.0
CES Protective Coating	Paint Remover	120.0
	TOTAL:	864.0

CATEGORY 8: PHOTO WASTE

SHOP	PRODUCT	YEARLY QTY (GALS)
CSG Photo Lab	Developer, Fixer	600.0
Armament Photo Procesing	Developer, Fixer	2000.0
EMS NDI	Developer, Fixer	60.0
	TOTAL:	2660.0

CATEGORY 9: NDI WASTE

SHOP	PRODUCT	YEARLY QTY (GALS)
EMS NDI	Penetrant, Emulsifier Freon	130.0
	TOTAL:	130.0

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APPENDIX E

Disposal Practices By Shop For England AFB

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DISPOSAL PRACTICES BY SHOP FOR ENGLAND AFB

Type of Shop: 23 CSG Photo Lab — Building Number: 1009

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Fixers/Developers	600.000	DD/SRDD
Waste Acid	1.000	DD
TOTAL:	601	

Type of Shop: Armament Photo Processing Lab — Building Number: 1009

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Fixers/Developers	800.000	DD
TOTAL:	800	

Type of Shop: 23 EMS AGE — Building Number: 120

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Transmission fluid	120.000	UIP
Safety Kleen solvent	600.000	C
Waste oil	900.000	D
Hydraulic fluid	360.000	D
A/C Cleaning soap	600.000	RDD
Brake fluid	35.000	UIP
TOTAL:	2615	

Type of Shop: Auto Hobby Shop — Building Number: 1434

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Paint Sludge	12.000	TID
Safety Kleen Units	3.000	C
Transmission Fluid	300.000	D
Waste Motor Oil	900.000	D
Soaps	300.000	RDD
TOTAL:	1515	

Type of Shop: EMS 76th Combat Munitions — Building Number: 1625

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Paint Sludge	60.000	D
PD-680	6.000	D
Brake Fluid	12.000	D
Paint Thinners	60.000	D
TOTAL:	138	

DISPOSAL PRACTICES BY SHOP FOR ENGLAND AFB

Type of Shop: 23 CES Protective Coating Building Number: 1703

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Paint Strippers	100.000	D
Paint Thinners	60.000	D
Old paint	50.000	D
TOTAL:	210	

Type of Shop: CES Liquid Fuels Building Number: 1703

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
JP-4	450.000	D
TOTAL:	450	

Type of Shop: Trans Allied Trades Building Number: 1707

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Paint thinners	18.000	D
Paint waste	6.000	D
Soaps	12.000	DD
TOTAL:	36	

Type of Shop: Trans Vehicle Maintenance Building Number: 1707

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Safety Kleen solvent	1200.000	C
Auto fuel	240.000	D
Engine Oil	40.000	D
Industrial Blue soap	600.000	RDD
Hydraulic fluid	40.000	D
Brake fluid	40.000	D
Sulfuric	12.000	NDD
Antifreeze	240.000	DD
Transmission fluid	40.000	D
TOTAL:	2452	

DISPOSAL PRACTICES BY SHOP FOR ENGLAND AFB

Type of Shop: Survival Equipment Building Number: 208

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
MEK and TCE waste	1.000	UIP
Trichloroethane	1.000	DD
Floor stripper	12.000	DD
Lubricating oil	5.000	D
White floating Soap	6.000	DD
TOTAL:	25	

Type of Shop: CES Jet Maintenance Building Number: 2102

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Waste acids	680.000	D
Engine Oil	140.000	D
Soaps	90.000	DD
Degreasants	680.000	D
Solvents	720.000	C and D
TOTAL:	2310	

Type of Shop: 23 EMS Armament System Building Number: 2108

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Solvents	2100.000	C
TOTAL:	2100	

Type of Shop: Trans Refueling Maintenance Building Number: 2401

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Auto Fuel	12.000	D
JP-4	600.000	RTT
Industrial Blue soap	240.000	RDD
Engine Oil	240.000	D
Transmission fluid	70.000	D
Brake fluid	3.000	UIP
Antifreeze	60.000	DD
TOTAL:	1225	

Type of Shop: Fuels Lab Building Number: 2403

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Industrial Blue Soap	110.000	RDD
TOTAL:	110	

DISPOSAL PRACTICES BY SHOP FOR ENGLAND AFB

Type of Shop: 23 CRS Electric/Battery Building Number: 2502

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Oil	36.000	D
TOTAL:	36	

Type of Shop: 23 CRS Pneudraulics Building Number: 2502

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Solvents	120.000	D
Hydraulic Fluid	300.000	D
Floor Polish Remover	24.000	DD
TOTAL:	444	

Type of Shop: 23 EMS Corrosion Control Building Number: 2502

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Paint thinners	1200.000	D
Paint Sludge	1200.000	D
Degreasers	160.000	C
Aircraft soap	4800.000	DD
Cleaning solvents	160.000	C
Waste acids	2.000	D
Paint strippers	720.000	D
TOTAL:	8242	

Type of Shop: EMS Metal Processing Building Number: 2502

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Lubricating Oil	10.000	D
TOTAL:	10	

Type of Shop: Phase Maintenance Building Number: 2502

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Soaps	50.000	DD
Engine Oil	1100.000	D
Hydraulic Fluid	25.000	D
TOTAL:	1175	

DISPOSAL PRACTICES BY SHOP FOR ENGLAND AFB

Type of Shop: 23 EMS NDI — Building Number: 2528

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Fixer/Developer	12.000	SRDD
Degreaser	6.000	KIT
Lubricating oil	60.000	KIT
TOTAL:	78	

Type of Shop: 23 CRS Flight Simulator — Building Number: 303

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Lubricating oil	1.000	D
Hydraulic fluid	150.000	D
Cleaning solvents	3.000	UIP
TOTAL:	154	

Type of Shop: CES Fire Dept. — Building Number: 500

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Auto fuel	0.000	RTT
Degreasers	60.000	RDD
Engine Oil	144.000	KIT
Hydraulic fluid	6.000	KIT
Brake fluid	1.000	KIT
Waste solvent	60.000	D
Firefighting chem.	3000.000	DD
Antifreeze	4.000	DD
Industrial Blue soap	240.000	RDD
Transmission fluid	6.000	KIT
TOTAL:	3521	

Type of Shop: 76th AMU Support Section — Building Number: 525

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Jet Fuel	2400.000	FTP and D
Engine Oil	120.000	D
Hydraulic Fluid	360.000	D
TOTAL:	2880	

DISPOSAL PRACTICES BY SHOP FOR ENGLAND AFB

Type of Shop: EMS Wheel and Tire Building Number: 814A

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Safety Kleen	2000.000	C
TOTAL:	2000	

Type of Shop: CRS Fuel System Repair Building Number: 814B

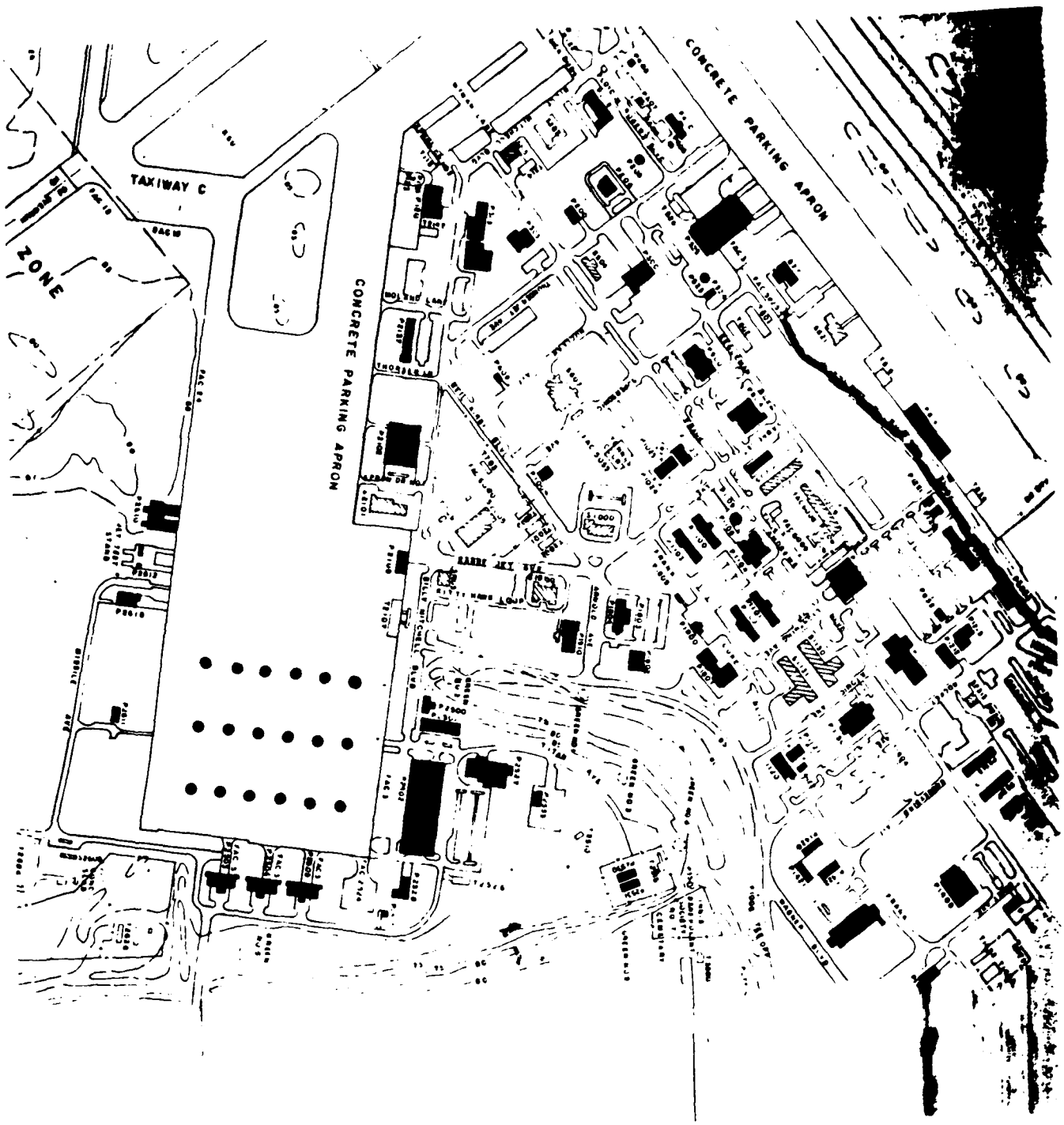
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Adhesive	8.000	E
JP-4	900.000	D
MEK	12.000	E
TOTAL:	920	

Type of Shop: EMS Armament Loading System Building Number: 834

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Paint thinners	0.500	UIP
Lubricating oil	8.000	D
TOTAL:	9	

Appendix F

Base Map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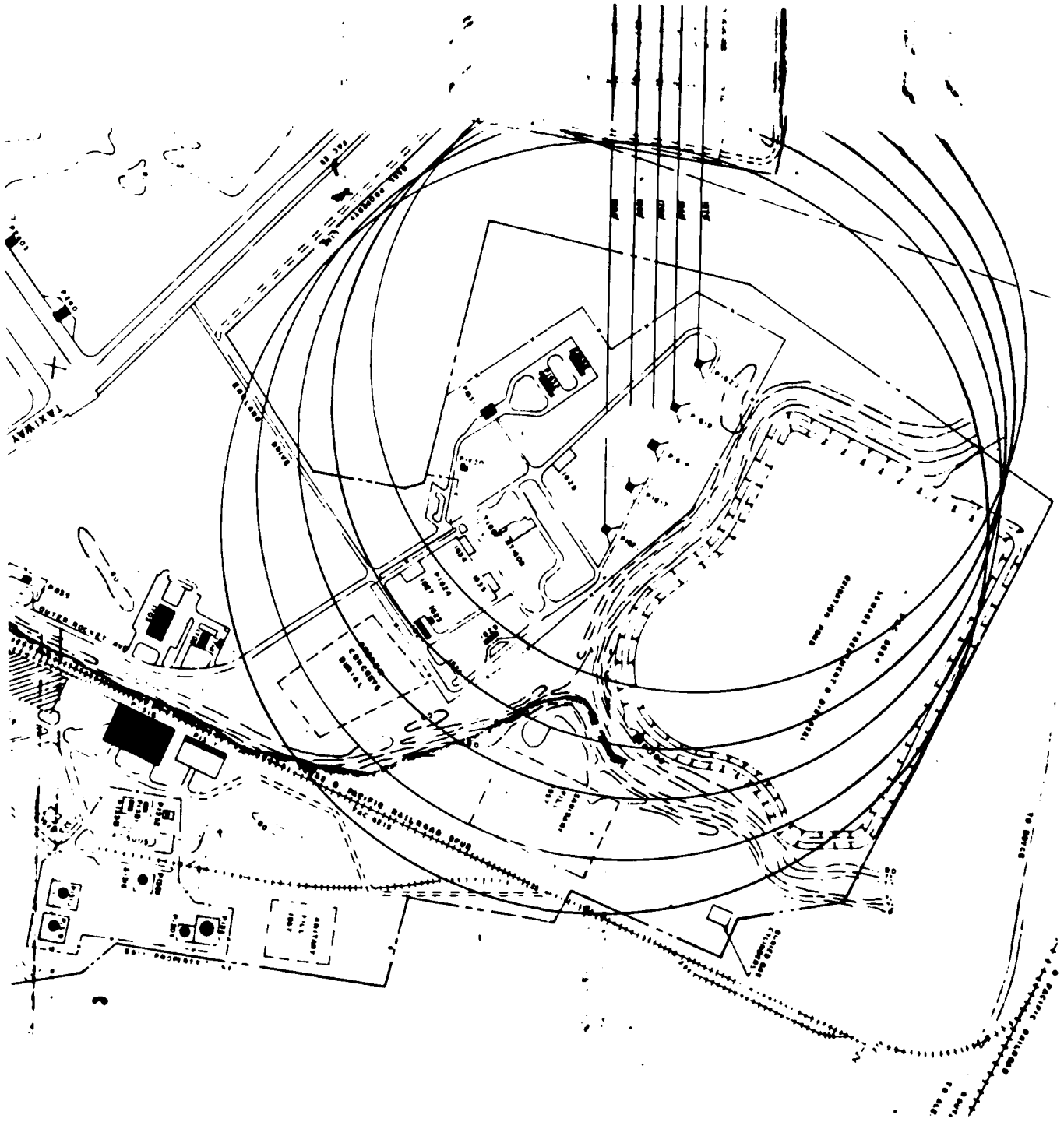
ZONE
CONCRETE PARKING APRON
CONCRETE PARKING APRON



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